US012131386B1

(12) **United States Patent**
Patton et al.

(10) **Patent No.: US 12,131,386 B1**
(45) **Date of Patent: Oct. 29, 2024**

(54) **REAL ASSET FRACTIONALIZATION ALGORITHM**

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(73) Assignee: **TRETE Inc.**, Prosper, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/616,173**

(22) Filed: **Mar. 26, 2024**

Related U.S. Application Data

(60) Provisional application No. 63/596,471, filed on Nov. 6, 2023, provisional application No. 63/509,257, filed on Jun. 20, 2023, provisional application No. 63/509,261, filed on Jun. 20, 2023, provisional application No. 63/509,264, filed on Jun. 20, 2023, provisional application No. 63/509,266, filed on Jun. 20, 2023, provisional application No. 63/600,381, filed on Nov. 17, 2023, provisional application No. 63/615,108, filed on Dec. 27, 2023, provisional application No. 63/615,128, filed on Dec. 27, 2023, provisional application No. 63/615,136, filed on Dec. 27, 2023, provisional application No. 63/615,145, filed on Dec. 27, 2023.

(51) **Int. Cl.**
G06Q 40/06 (2012.01)

(52) **U.S. Cl.**
CPC ***G06Q 40/06*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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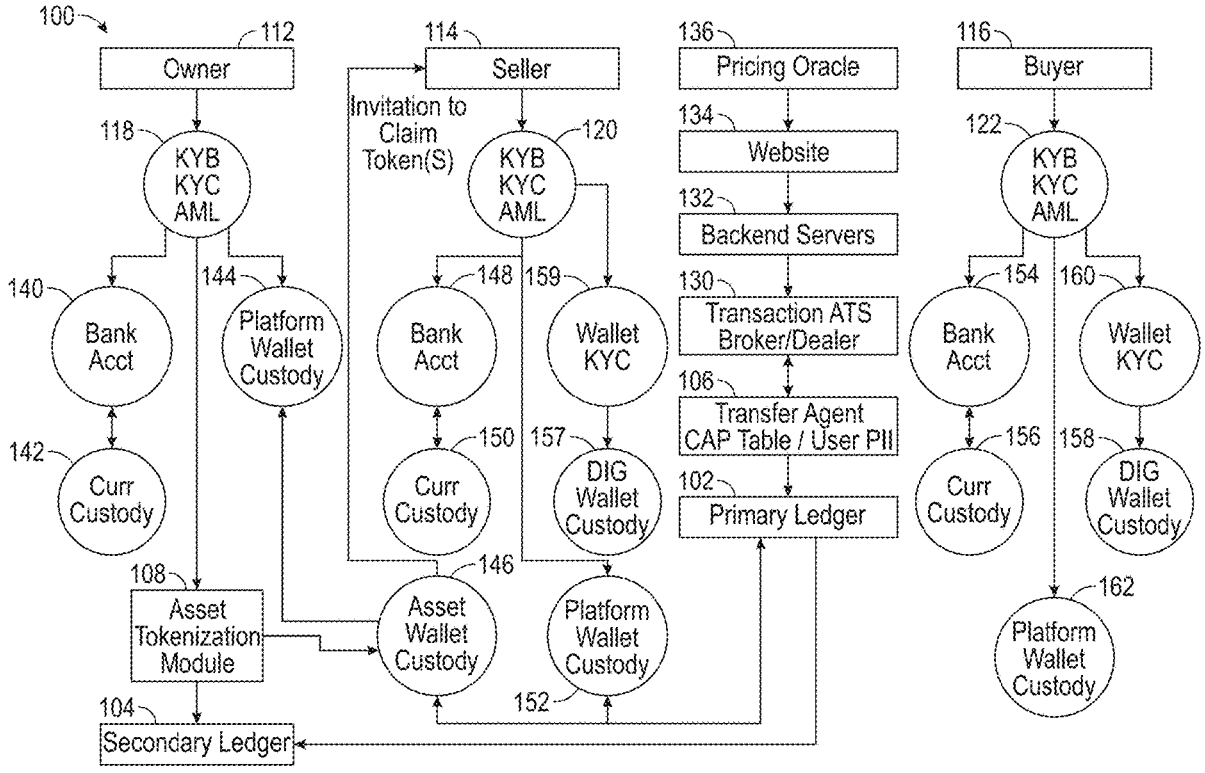
Primary Examiner — Narayanswamy Subramanian

(57) **ABSTRACT**

In certain aspects of the disclosure, a computer-implemented method includes receiving information regarding characteristics of a real asset. The method includes tokenizing at least one digital asset representing fractional shares in the real asset. The method includes determining the initial share price. The method includes updating a capitalization table based on the number shares and share price. The method includes performing a transaction based on share price. Systems and machine-readable media are also provided.

10 Claims, 11 Drawing Sheets



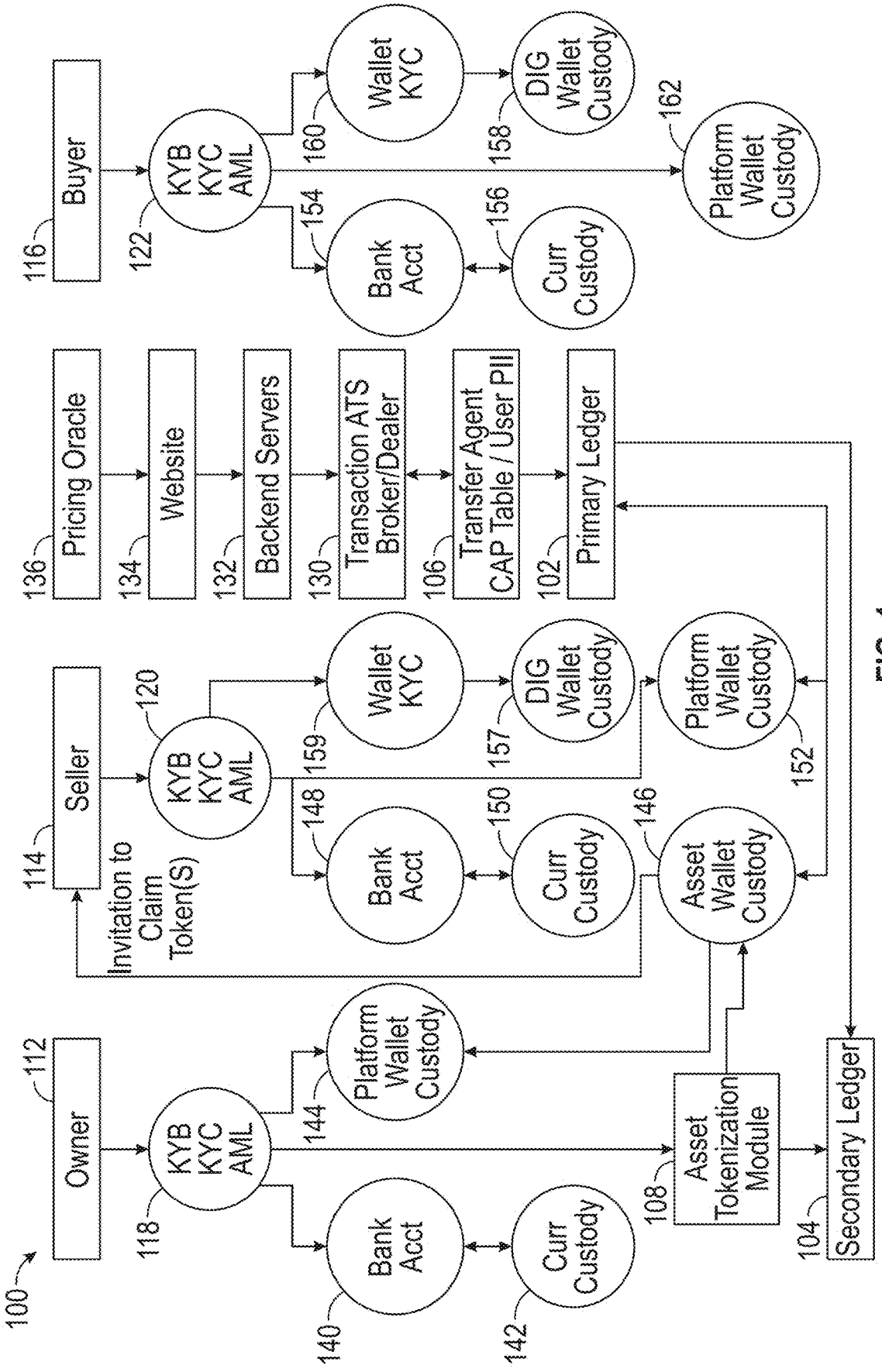

100
Owner
112
KYB KYC AML
118
Bank Acct
140
Curr Custody
142
Platform Wallet Custody
144
Asset Tokenization Module
108
Secondary Ledger
104
Seller
114
KYB KYC AML
120
Bank Acct
148
Curr Custody
150
Asset Wallet Custody
146
Platform Wallet Custody
152
Wallet KYC
159
DIG Wallet Custody
157
Invitation to Claim Token(S)
Buyer
116
KYB KYC AML
122
Bank Acct
154
Curr Custody
156
Wallet KYC
160
DIG Wallet Custody
158
Platform Wallet Custody
162
Pricing Oracle
136
Website
134
Backend Servers
132
Transaction ATS Broker/Dealer
130
Transfer Agent CAP Table / User PII
106
Primary Ledger
102

FIG. 1

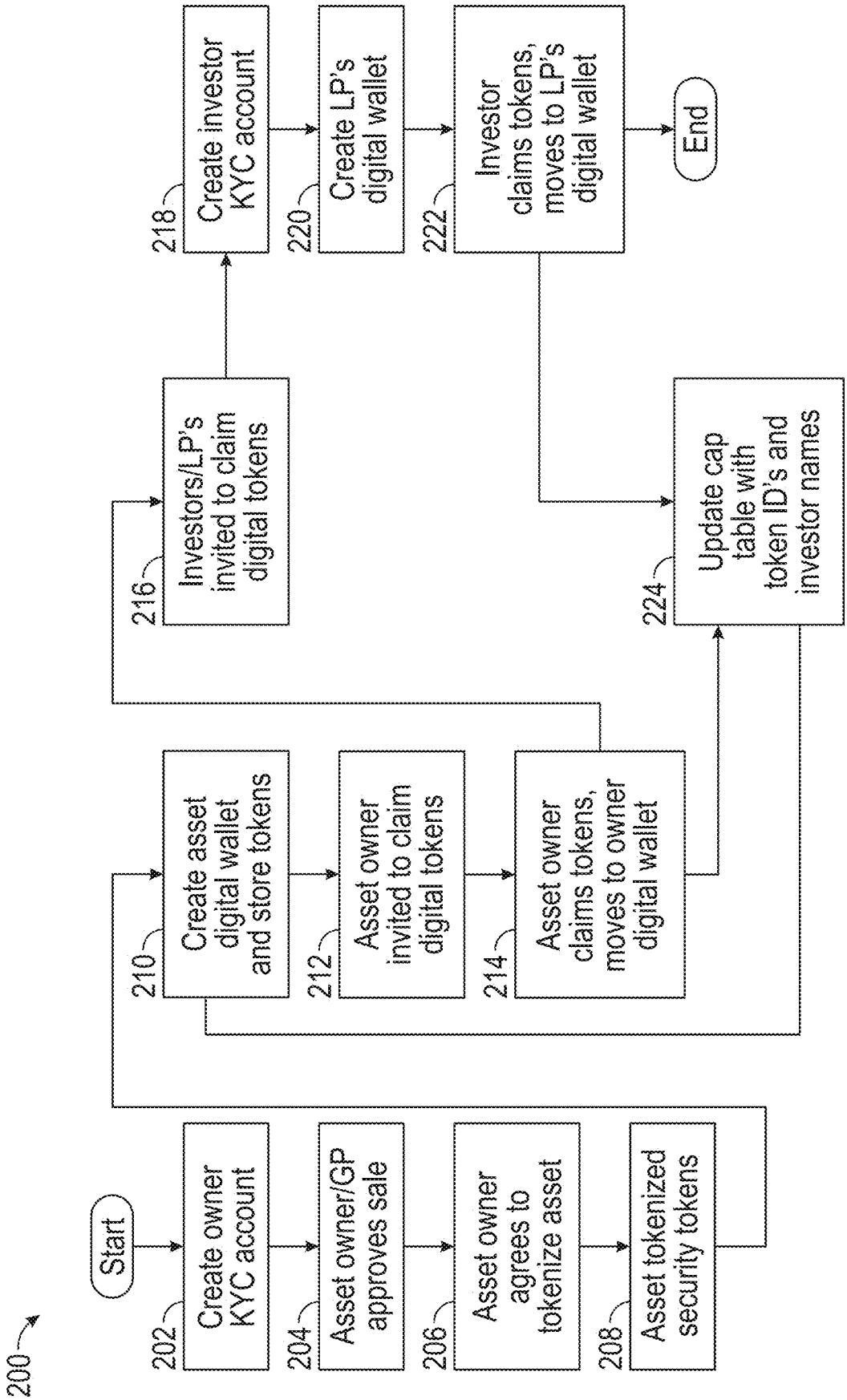

200
Start
202
Create owner KYC account
204
Asset owner/GP approves sale
206
Asset owner agrees to tokenize asset
208
Asset tokenized security tokens
210
Create asset digital wallet and store tokens
212
Asset owner invited to claim digital tokens
214
Asset owner claims tokens, moves to owner digital wallet
216
Investors/LP's invited to claim digital tokens
218
Create investor KYC account
220
Create LP's digital wallet
222
Investor claims tokens, moves to LP's digital wallet
224
Update cap table with token ID's and investor names
End

FIG. 2

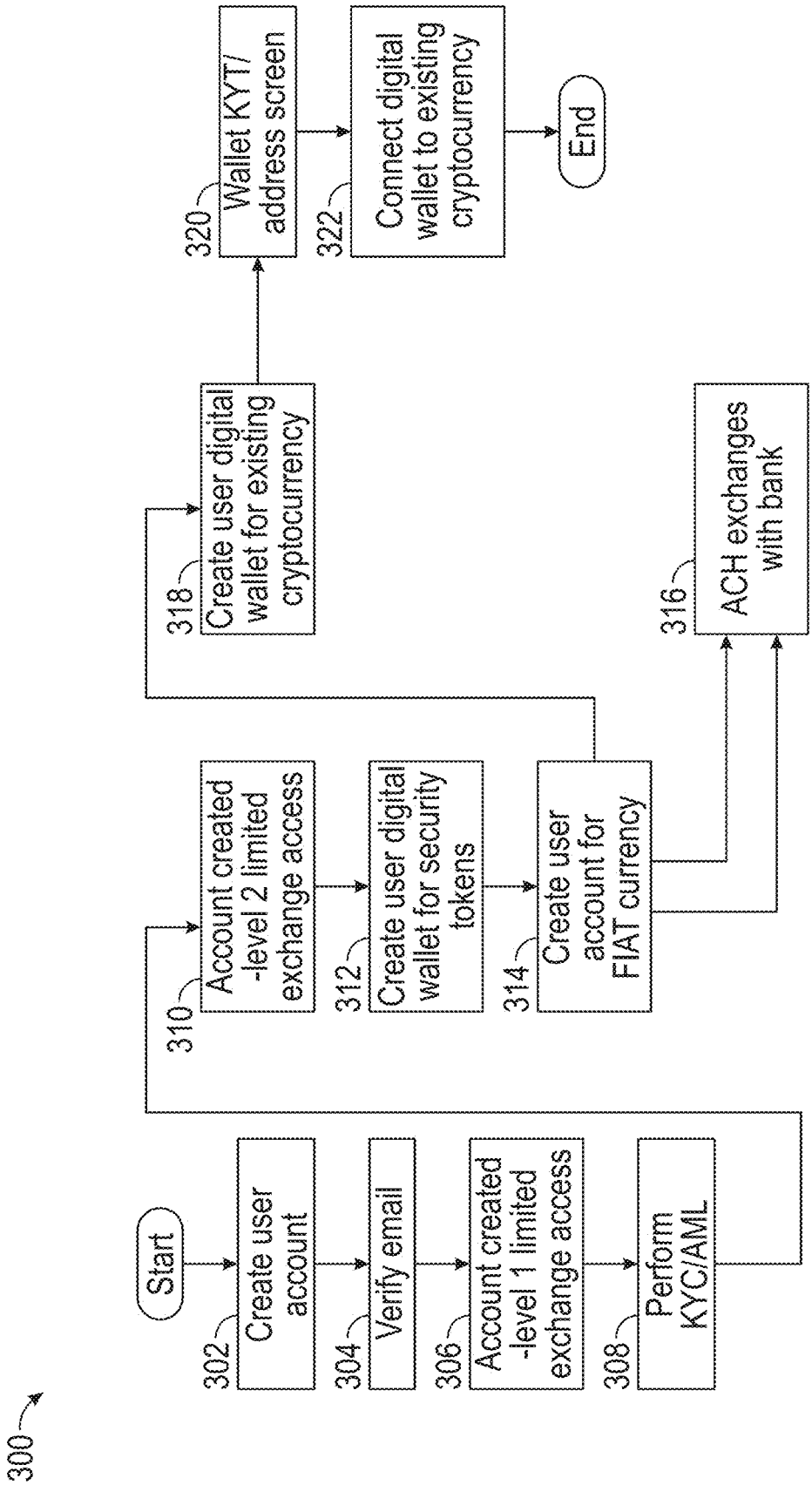

300
Start
302
Create user account
304
Verify email
306
Account created -level 1 limited exchange access
308
Perform KYC/AML
310
Account created -level 2 limited exchange access
312
Create user digital wallet for security tokens
314
Create user account for FIAT currency
316
ACH exchanges with bank
318
Create user digital wallet for existing cryptocurrency
320
Wallet KYT/ address screen
322
Connect digital wallet to existing cryptocurrency
End

FIG. 3

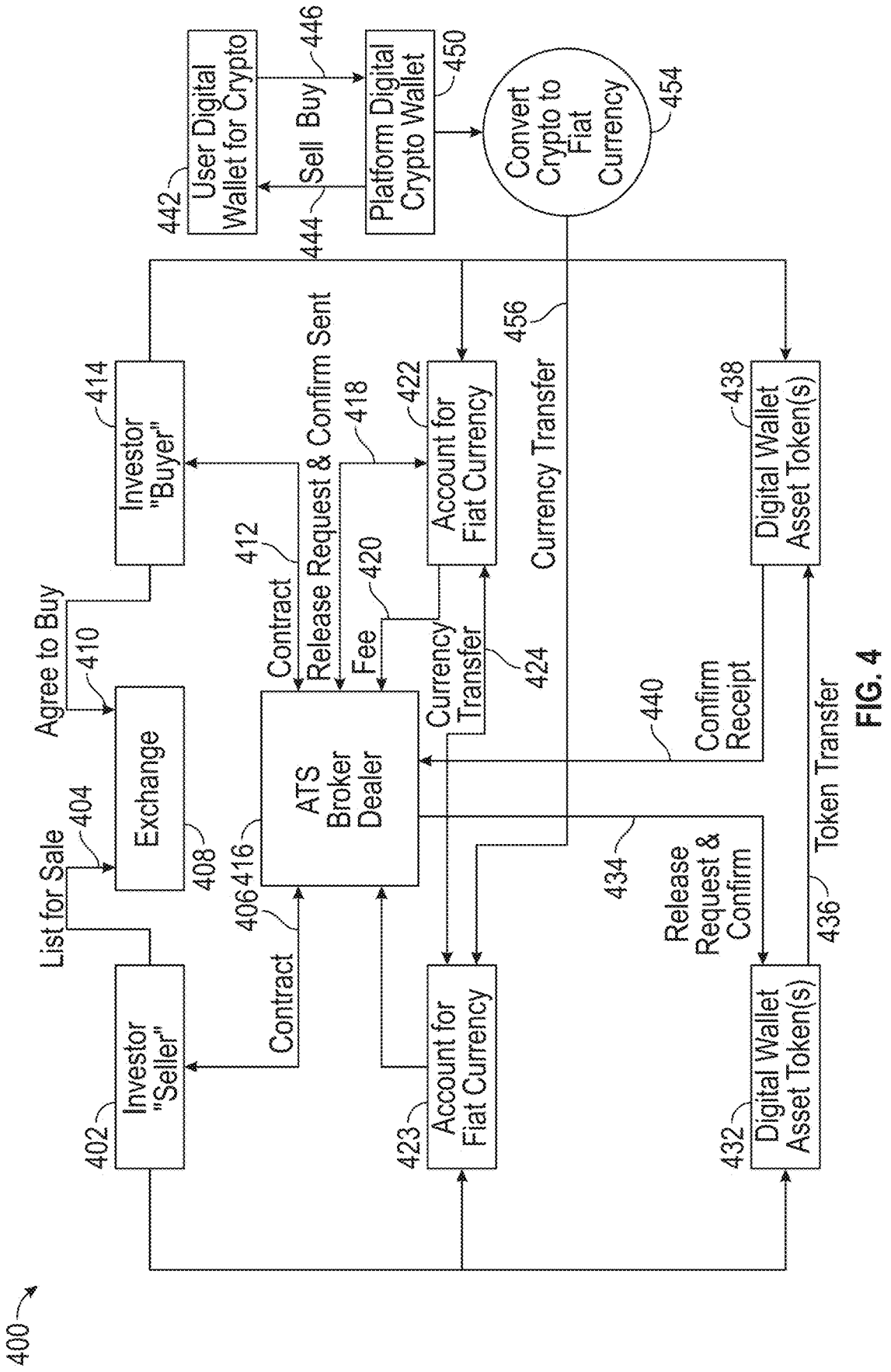

400
Investor "Seller"
402
List for Sale
404
Exchange
408
Agree to Buy
410
Investor "Buyer"
414
Contract
406
Contract
412
ATS Broker Dealer
416
Release Request & Confirm Sent
418
Fee
420
Account for Fiat Currency
422
Account for Fiat Currency
423
Currency Transfer
424
Currency Transfer
456
Convert Crypto to Fiat Currency
454
Platform Digital Crypto Wallet
450
Sell Buy
444
446
User Digital Wallet for Crypto
442
Digital Wallet Asset Token(s)
438
Confirm Receipt
440
Release Request & Confirm
434
Token Transfer
436
Digital Wallet Asset Token(s)
432

FIG. 4

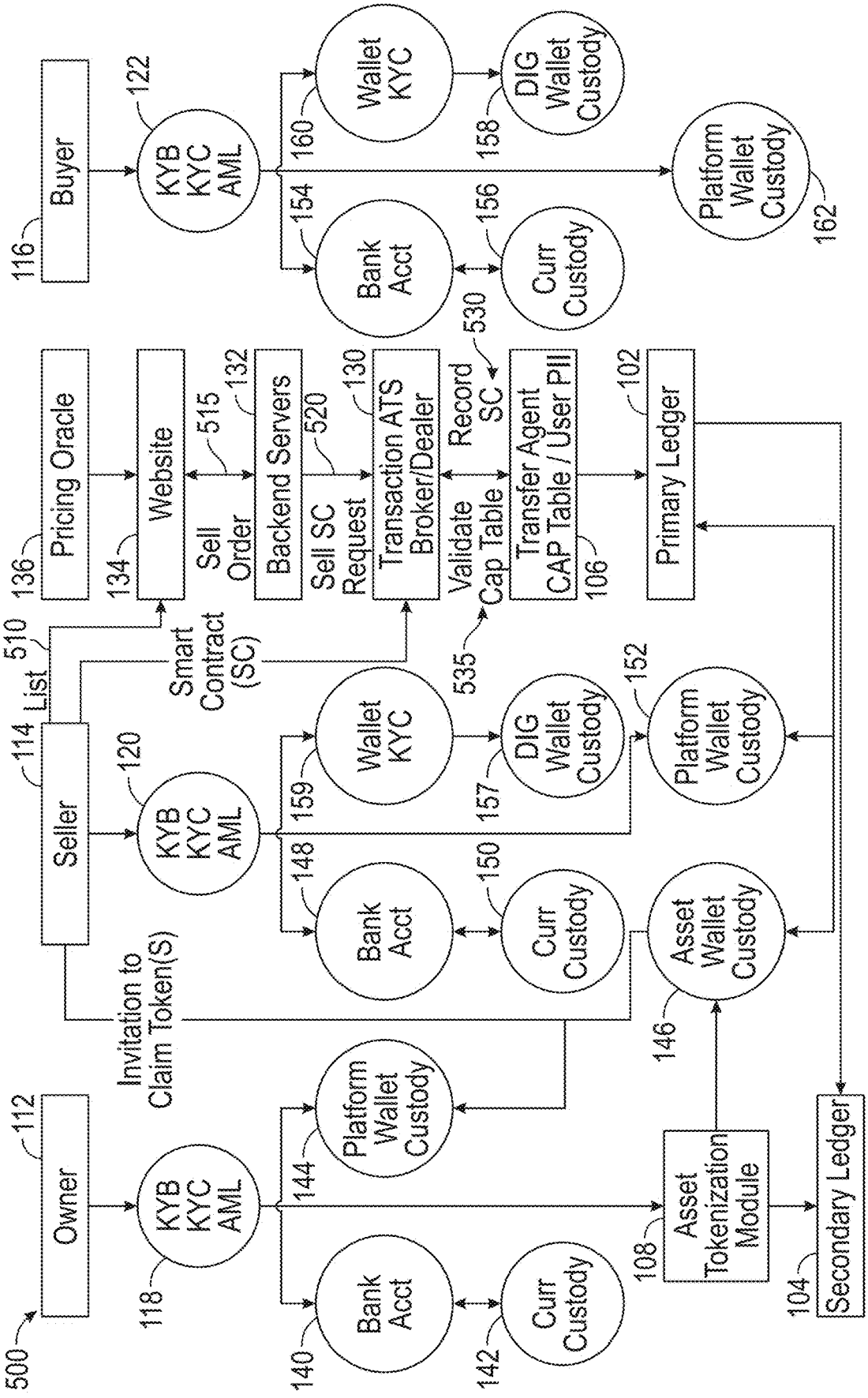
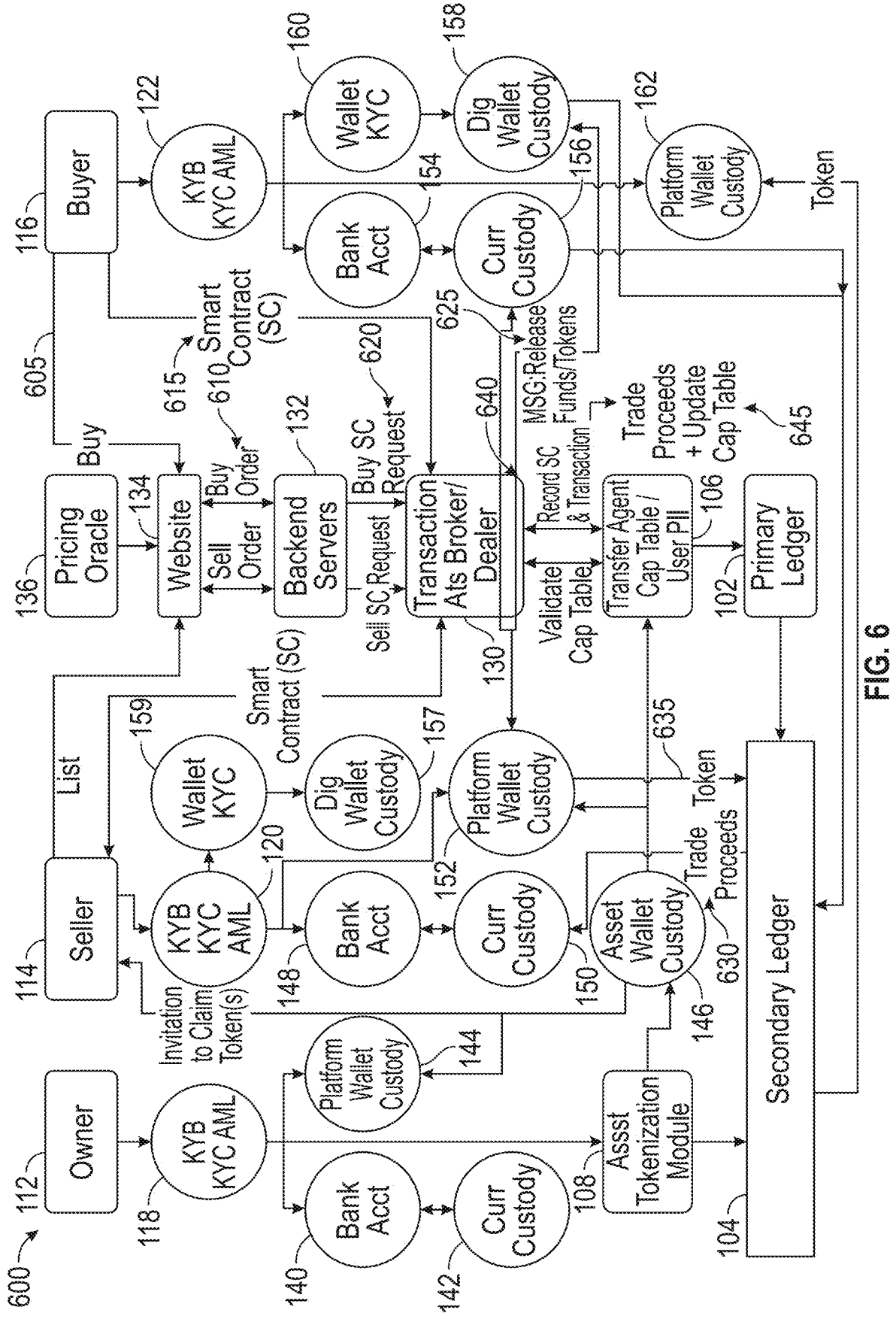

500
Owner
112
KYB KYC AML
118
Bank Acct
140
Curr Custody
142
Platform Wallet Custody
144
Asset Tokenization Module
108
Secondary Ledger
104
Asset Wallet Custody
146
Bank Acct
148
Curr Custody
150
Platform Wallet Custody
152
Seller
114
KYB KYC AML
120
Bank Acct
154
Curr Custody
156
Platform Wallet Custody
162
Buyer
116
KYB KYC AML
122
Wallet KYC
160
DIG Wallet Custody
158
Wallet KYC
159
DIG Wallet Custody
157
Invitation to Claim Token(S)
List
510
Smart Contract (SC)
Pricing Oracle
136
Website
134
Backend Servers
132
Transaction ATS Broker/Dealer
130
Transfer Agent CAP Table / User PII
106
Primary Ledger
102
Sell Order
515
Sell SC Request
520
Validate Cap Table
Record SC
530
535

FIG. 5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Owner
112
KYB KYC AML
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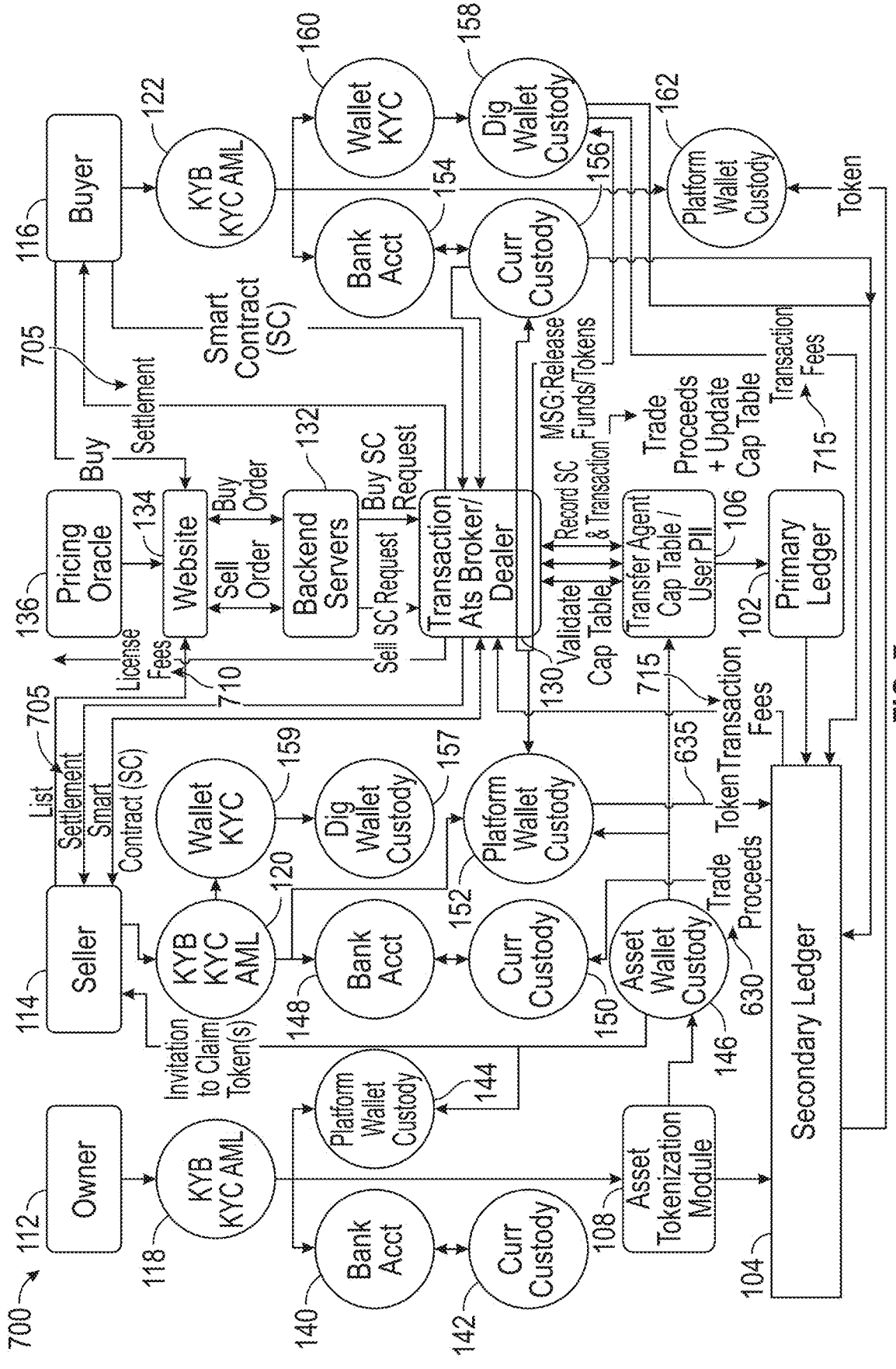
Bank Acct
140
Curr Custody
142
Platform Wallet Custody
144
Invitation to Claim Token(s)
Seller
114
KYB KYC AML
120
Bank Acct
148
Curr Custody
152
Asset Wallet Custody
146
150
Trade Proceeds
630
Assst Tokenization Module
108
Secondary Ledger
104
Token
635
List
Smart Contract (SC)
Wallet KYC
159
Dig Wallet Custody
157
Platform Wallet Custody
Buyer
116
KYB KYC AML
122
Wallet KYC
160
Dig Wallet Custody
158
Bank Acct
154
Curr Custody
156
Platform Wallet Custody
162
Token
605
Smart Contract (SC)
615
610
Buy
Buy Order
Pricing Oracle
136
Website
134
Sell Order
Backend Servers
132
Buy SC Request
620
Sell SC Request
Transaction Ats Broker/ Dealer
130
625
MSG:Release Funds/Tokens
640
Record SC & Transaction
Validate Cap Table
Transfer Agent Cap Table / User PII
106
Trade Proceeds + Update Cap Table
645
Primary Ledger
102

FIG. 6


700
Owner
112
KYB KYC AML
118
Bank Acct
140
Curr Custody
142
Platform Wallet Custody
144
Asset Tokenization Module
108
Secondary Ledger
104
Seller
114
KYB KYC AML
120
Bank Acct
148
Curr Custody
150
Asset Wallet Custody
146
Platform Wallet Custody
152
Dig Wallet Custody
157
Wallet KYC
159
Buyer
116
KYB KYC AML
122
Bank Acct
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Dig Wallet Custody
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Wallet KYC
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Platform Wallet Custody
162
Token
Pricing Oracle
136
Website
134
Backend Servers
132
Transaction Ats Broker/ Dealer
130
Transfer Agent Cap Table / User PII
106
Primary Ledger
102
Smart Contract (SC)
Settlement
705
Buy
Sell Order
Buy Order
Buy SC Request
Sell SC Request
License Fees
710
Validate Cap Table
Record SC & Transaction
MSG:Release Funds/Tokens
Trade Proceeds + Update Cap Table
715
Transaction Fees
635
Token Transaction Fees
Trade Proceeds
630
Invitation to Claim Token(s)
List Settlement Smart Contract (SC)

FIG. 7

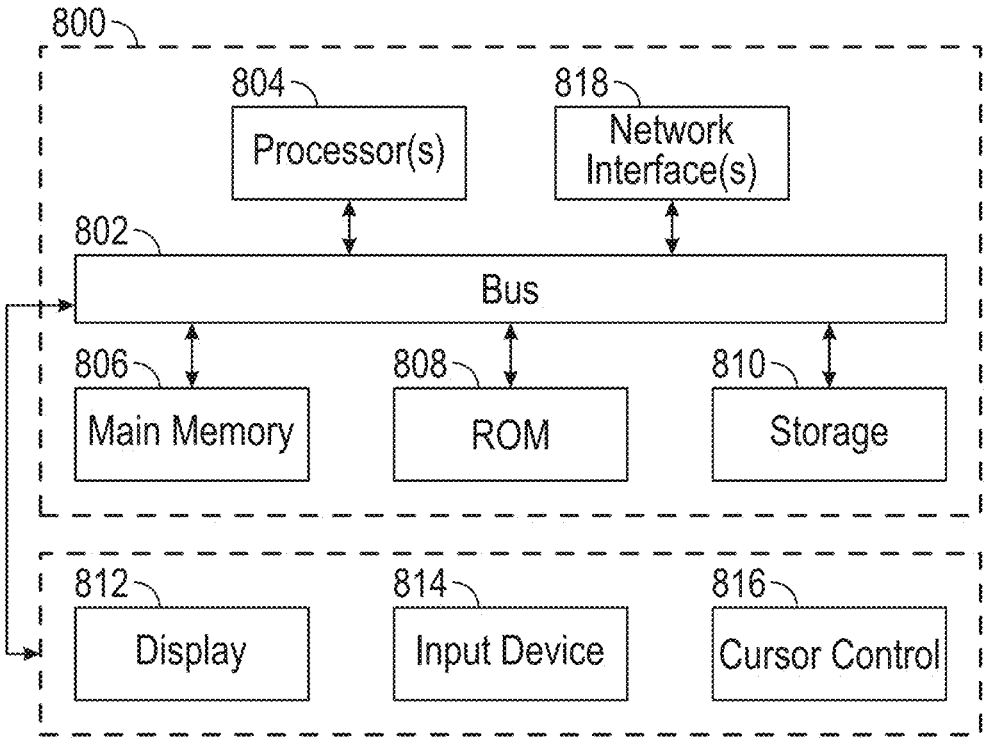
800
804
Processor(s)
818
Network Interface(s)
802
Bus
806
Main Memory
808
ROM
810
Storage
812
Display
814
Input Device
816
Cursor Control

FIG. 8

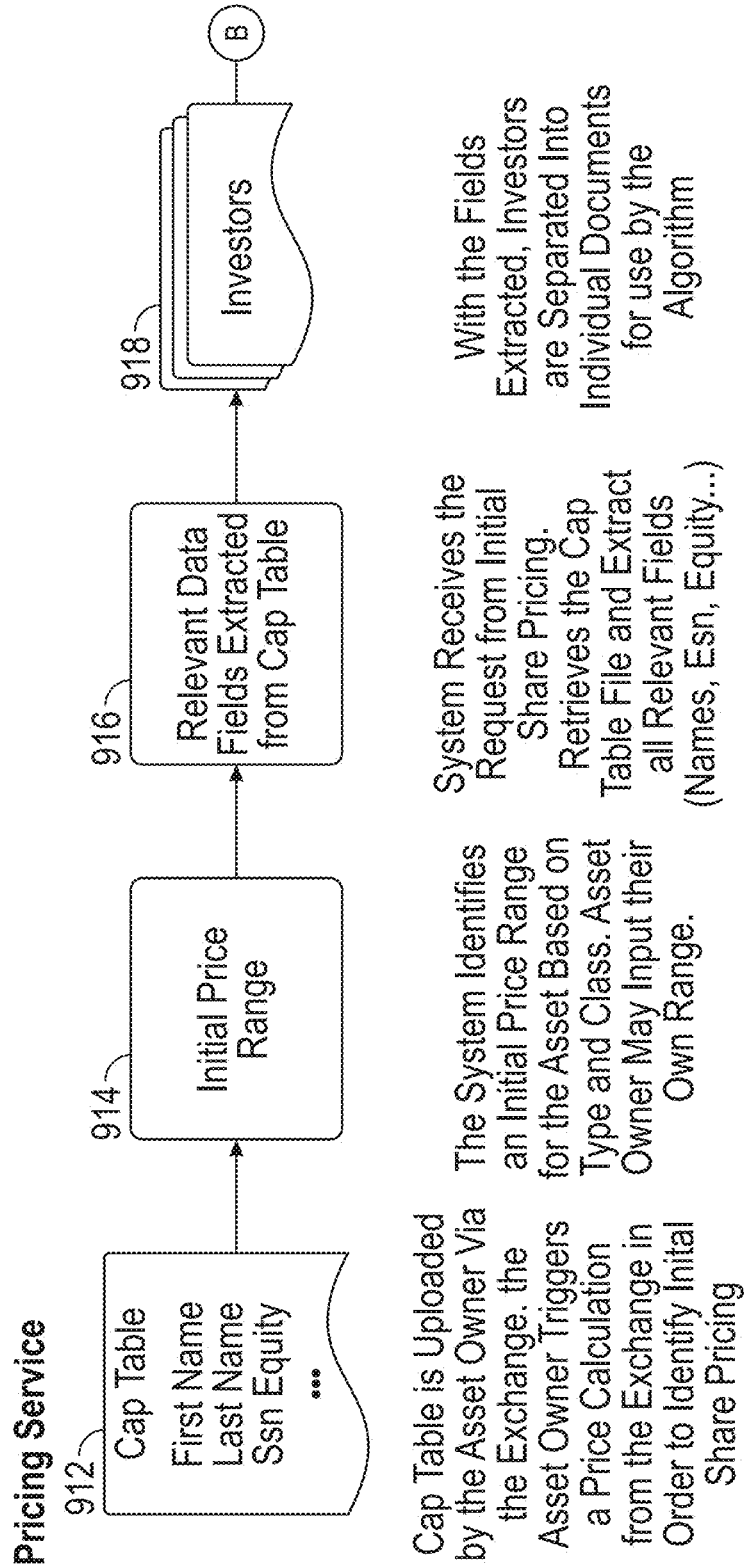
Pricing Service
912
Cap Table
First Name
Last Name
Ssn Equity
...
914
Initial Price Range
916
Relevant Data Fields Extracted from Cap Table
918
Investors
B
Cap Table is Uploaded by the Asset Owner Via the Exchange. the Asset Owner Triggers a Price Calculation from the Exchange in Order to Identify Inital Share Pricing
The System Identifies an Initial Price Range for the Asset Based on Type and Class. Asset Owner May Input their Own Range.
System Receives the Request from Initial Share Pricing. Retrieves the Cap Table File and Extract all Relevant Fields (Names, Esn, Equity...)
With the Fields Extracted, Investors are Separated Into Individual Documents for use by the Algorithm
Price Range

FIG. 9A

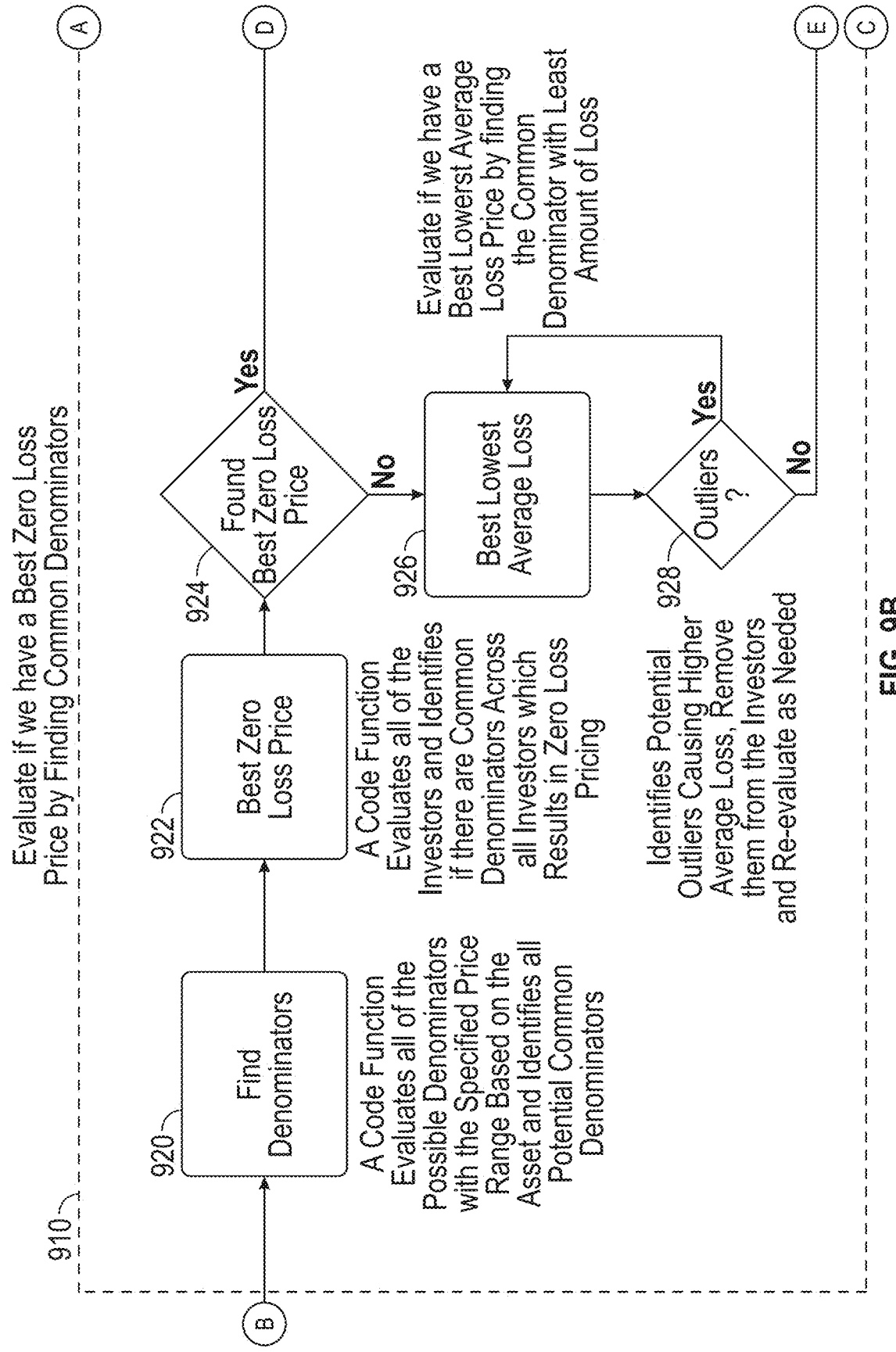
A
B
C
D
E
910
Evaluate if we have a Best Zero Loss Price by Finding Common Denominators
920
Find Denominators
A Code Function Evaluates all of the Possible Denominators with the Specified Price Range Based on the Asset and Identifies all Potential Common Denominators
922
Best Zero Loss Price
A Code Function Evaluates all of the Investors and Identifies if there are Common Denominators Across all Investors which Results in Zero Loss Pricing
924
Found Best Zero Loss Price
Yes
No
926
Best Lowest Average Loss
Evaluate if we have a Best Lowest Average Loss Price by finding the Common Denominator with Least Amount of Loss
928
Outliers ?
Yes
No
Identifies Potential Outliers Causing Higher Average Loss, Remove them from the Investors and Re-evaluate as Needed

FIG. 9B

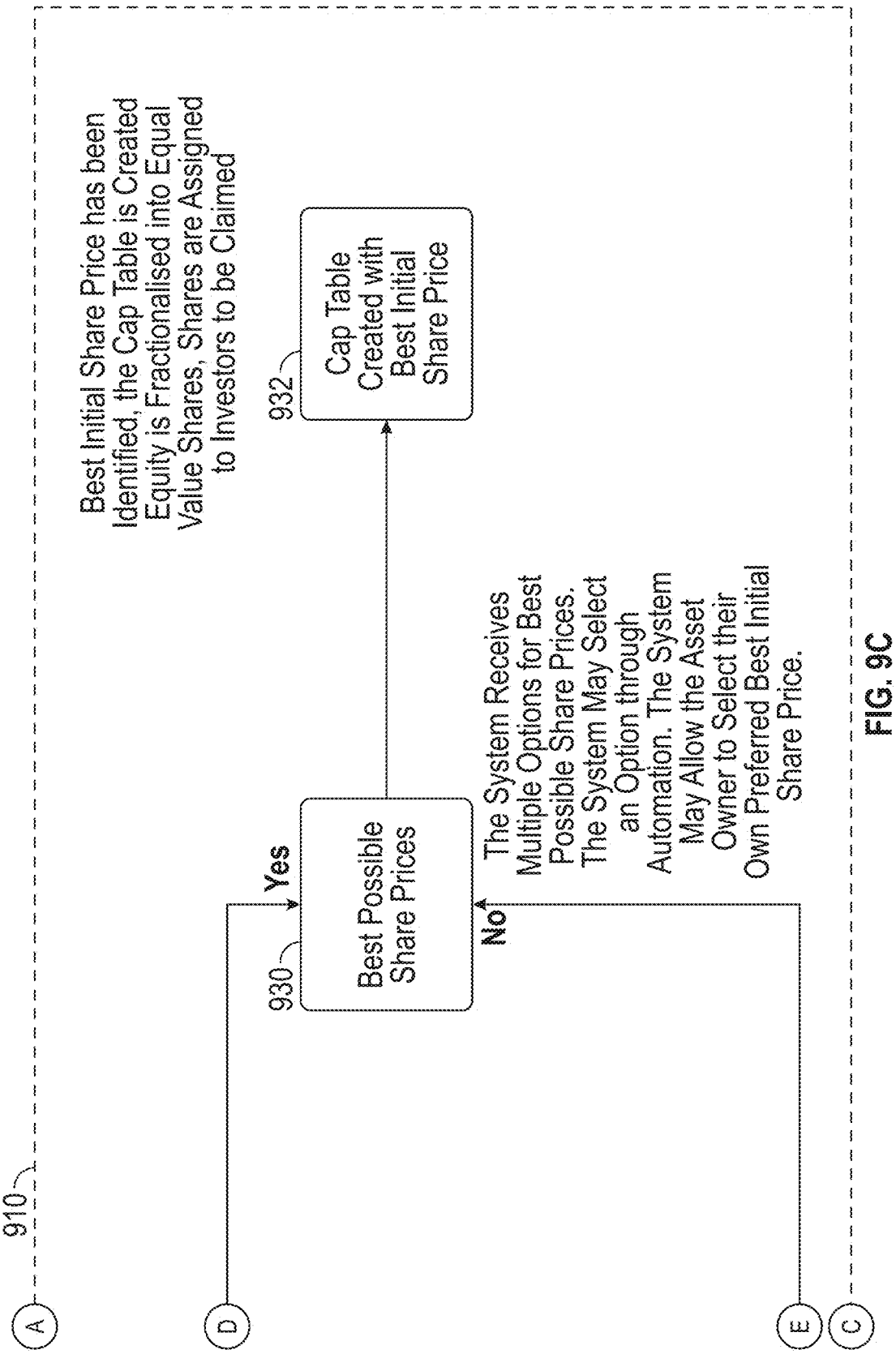
910
A
Best Initial Share Price has been Identified, the Cap Table is Created Equity is Fractionalised into Equal Value Shares, Shares are Assigned to Investors to be Claimed
932
Cap Table Created with Best Initial Share Price
930
Best Possible Share Prices
Yes
No
The System Receives Multiple Options for Best Possible Share Prices. The System May Select an Option through Automation. The System May Allow the Asset Owner to Select their Own Preferred Best Initial Share Price.
D
E
C

FIG. 9C

REAL ASSET FRACTIONALIZATION ALGORITHM

CROSS REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/454,622, entitled "Transaction Platform With Synchronized Semi-Redundant Ledgers," filed on Mar. 24, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/509,257, entitled "Data Retrieval and Validation for Asset Onboarding," filed on Jun. 20, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/509,261, entitled "Data Validation and Assessment Valuation," filed on Jun. 20, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/509,264, entitled "Secure Identifier Integration," filed on Jun. 20, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/509,266, entitled "Dual Ledger Syncing," filed on Jun. 20, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/515,337, entitled "Metadata Process, with Static and Evolving Attributes, Introduced into Tokenization Standards," filed on Jul. 24, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/596,471, entitled "Real Asset Fractionalization Algorithm," filed on Nov. 6, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/600,381, entitled "Settlement and Approval Service," filed on Nov. 17, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/615,108, entitled "Live Syncing Capitalization Table System," filed on Dec. 27, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/615,128, entitled "Transaction Flow with Master Account Ledger and Escrow Ledger Interaction," filed on Dec. 27, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/615,136, entitled "Regenerative Model—Continuous Evolution System ("RM-CES")," filed on Dec. 27, 2023, all of which is incorporated herein by reference in its entirety for all purposes. The present application claims the benefit of priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application Ser. No. 63/615,145, entitled "Transaction & Settlement Validation Service ("TSVS")," filed on Dec. 27, 2023, all of which is incorporated herein by reference in its entirety for all purposes.

TECHNICAL FIELD

The present disclosure generally relates to blockchain technology, e.g., cryptographically encoded ledgers distributed across a computing network, and more specifically relates to transaction platforms with semi-redundant ledgers.

BACKGROUND

There is a need for a technology platform that can create digital securities out of what are known as "real assets" and can function as a secondary market platform or Financial Exchange for these types of assets as well as for other types of assets such as, but not limited to, investments in franchises, investments in business that generate dividends or returns based on performance of the business or underlying asset, investments in ventures that capture or mine natural resource such as, but not limited to uranium, timber, and other commodities, private credit, private debt, intangible assets, tradeable assets, and any other types of appropriate assets. Examples of real assets include office buildings, multi-family apartment buildings, car washes, private planes or yachts, antique cars, art, jewelry, insurance policies, and even structured products that are based on the performance of an underlying asset (e.g. a racehorse). It should be understood that the disclosed technology is not limited to creating digital securities.

Real estate, for example, has long been a preferred investment, offering competitive risk-adjusted returns and a hedge against inflation. Direct investments in industries, such as real estate, e.g., purchasing real estate directly, involves deploying and risking large initial and ongoing financial sums. In contrast, indirect investments, e.g., Real Estate Investment Trusts (REITs) and other deal structures and/or securities that pool sums of money from multiple investors together to purchase investments, facilitate individual investors deploying and risking smaller initial and ongoing financial sums. Such indirect investments also involve other costs and require compliance with relevant securities statutes and regulations.

The description provided in the background section should not be assumed to be prior art merely because it is mentioned in or associated with the background section. The background section may include information that describes one or more aspects of the subject technology.

SUMMARY

An exemplary aspect relates to an electronic and computer technology platform for facilitating a "closed" electronic secondary market exchange for tokens (e.g., cryptographic tokens that represent shares or other interests in real estate and/or other assets) which are created by and may be traded by participants registered and validated by a computer system integrated within the technology platform (as opposed to third party token marketplaces). The technology platform includes a novel specialized computer architecture and customized computer code adapted and programmed to implement novel functions that are not currently and have not previously been performed with prior asset exchange platforms. Novel aspects include semi-redundant ledgers that are automatically synchronized by the computer system

and which overcome other technical limitations of prior transaction management systems. (possible to have third party market places)

An exemplary aspect relates to a pair of synchronized semi-redundant ledgers that maintain a public and/or private record of each transaction executed on the platform (for example, recorded on a blockchain), in which personally identifiable information (PII) of parties to the transaction are not disclosed and therefore not publicly accessible via the semi-redundant ledgers. In other aspects, the pair of synchronized semi-redundant ledgers maintain, instead, a private record of each transaction. An example can be a regular ledger of any type that is backed up and synchronized with a blockchain (public or private ledger). This automated auditing mechanism facilitates fraud, theft, and loss (if used for inventory instead of real assets). For example, a Consumer Packaged Goods ("CPG") company could keep their entire inventory system on the blockchain to audit stores to control shrinkage, loss prevention, and/or theft.

An exemplary aspect of the disclosed technology includes a computer system specially configured and programmed to perform functions of a transaction platform that includes a network-accessible computer server system with semi-redundant ledgers which are automatically synchronized by the computer system. The semi-redundant ledgers include a first ledger type that may include a database (e.g., centrally controlled by an operator of the computer system); a tokenization module configured to create and/or manage tokens as described herein and configured to interact with a second ledger (e.g., a blockchain); a digital wallet management module configured to receive, store, and transmit digital tokens; and a role-based access module configured to validate participants and their authorized roles as well as authorize and/or limit the participants' functional interactions with the computer system based on their approved roles. The transaction platform with semi-redundant ledgers may provide mechanisms by which investors may trade and/or exchange (e.g., acquire and/or transfer) tokenized portions of real estate/real properties while remaining anonymous (as described herein). The tokenized portions of real estate/real properties may be referred to herein as "asset tokens." The mechanisms by which the investors may trade and/or exchange tokenized portions of real estate/real properties may include tokenization and a dual ledger system. The transaction platform may facilitate a property owner to tokenize the property by generating multiple tokens collectively representing the value of the property. The transaction platform may facilitate investors to browse listed properties and tokens representing fractional shares of the value of one or more properties. The transaction platform may facilitate investors to acquire and transfer the tokens.

An exemplary aspect of the disclosed technology may include the transaction platform being specially configured and programmed to record token transactions in two semi-redundant ledgers on a computing network. One ledger, referred to herein as the "primary ledger," is configured to maintain data stored therein as confidential. The primary ledger may be internal to the transaction platform. In the primary ledger, asset token transactions may be recorded in association with personally identifiable information (PII) of the buyer and seller of the token. The transactions are also recorded in a public or private ledger, referred to herein as the "secondary ledger." The secondary ledger may be implemented as a blockchain. In certain aspects, the secondary ledger is configured to support immutable features. The secondary ledger may be configured to not store personally identifiable information (PII) of the buyer(s) or seller(s).

While exemplary aspects of the transaction platform are described herein with reference to an underlying real estate or real property asset, it should be understood that the technology disclosed herein may be applied to any type of underlying asset including, but not limited to, intangible assets.

An exemplary method of exchanging digital assets representing fractional interests in an asset includes receiving information regarding characteristics (e.g., size, location, calculated values, depreciation) of an asset and generating a plurality of digital assets representing fractional interests in the asset. The method also includes establishing a smart contract for exchanging at least one of the plurality of digital assets held by a first entity for trade proceeds from a second entity. The method additionally includes performing a transaction according to the smart contract, and updating a capitalization table based on the performed transaction. The method further includes recording data pertaining to the performed transaction on a blockchain.

Others may be notified of the information regarding characteristics of an asset. Others may be invited to propose an exchange for at least one of the plurality of digital assets representing fractional interests in the asset. A proposal of an exchange for at least one of the plurality of digital assets may be received. Establishing the smart contract for the exchange for at least one of the plurality of digital assets may be responsive to receiving the proposal of the exchange.

The method may further include waiting a predefined period of time after a current owner's acquisition of the asset prior to inviting others to propose an exchange for at least one of the plurality of digital assets representing fractional interests in the asset. Transaction fees may be collected from at least one of the first entity and the second entity, the transaction fees set according to the smart contract governing the performed transaction. At least some of the collected transaction fees may be distributed as license fees to a third entity. Settlement statements pertaining to the performed transaction may be distributed to at least one of the first entity and the second entity. The method may additionally include recording transaction data pertaining to the performed transaction, including personally identifiable information of at least one of the first entity or the second entity, in a primary ledger configured to maintain the transaction data as confidential, and recording transaction data pertaining to the performed transaction, absent personally identifiable information of the first entity and the second entity, in a secondary ledger configured to make the transaction data publicly or privately available on a blockchain. The asset may include real estate, for example, and the digital assets representing fractional interests in the asset may include nonfungible tokens (NFTs), and/or, but is not limited to, fungible tokens, hybrid tokens, cryptocurrencies, crypto tokens, crypto coins, security token, and asset tokens, having metadata including identification information of the buyer of the NFTs. The smart contract may be established by a broker/dealer with at least one of the first entity or the second entity.

An exemplary non-transitory computer readable medium stores computer-readable instructions executable by a hardware computing processor to perform operations of a method for recording transactions with semi-redundant ledgers as described herein.

An exemplary system for recording transactions with semi-redundant ledgers includes at least one device including a hardware computing processor, the system being configured to perform operations of a method for recording transactions with semi-redundant ledgers as described

herein. The system may include a non-transitory memory having stored thereon computing instructions, executable by the hardware computing processor, to perform operations of a method for recording transactions with semi-redundant ledgers as described herein.

An exemplary system for recording transactions with semi-redundant ledgers includes at least one device including a hardware circuit operable to perform a function, the system being configured to perform operations of a method for recording transactions with semi-redundant ledgers as described herein.

According to certain aspects of the present disclosure, a computer-implemented method is provided. The method includes receiving information regarding characteristics of an asset. The method includes generating at least one digital asset representing fractional interests in the asset. The method includes facilitating establishment of a smart contract for exchanging the at least one digital asset held by a first entity for trade proceeds from a second entity. The method includes performing a transaction based on the smart contract. The method includes updating a capitalization table based on performing the transaction. The method includes recording data, pertaining to the transaction that is performed, on a primary ledger and a secondary ledger.

According to certain aspects of the present disclosure, a system is provided. The system includes one or more memories comprising instructions and one or more processors configured to execute the instructions which, when executed, cause the one or more processors to receive information regarding characteristics of an asset. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to generate at least one digital asset representing fractional interests in the asset. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to facilitate establishment of a smart contract for exchanging the at least one digital asset held by a first entity for trade proceeds from a second entity. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to perform a transaction based on the smart contract. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to update a capitalization table based on performing the transaction. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to record data, pertaining to the transaction that is performed, on a primary ledger and a secondary ledger.

According to other aspects of the present disclosure, a non-transitory machine-readable storage medium comprising machine-readable instructions for causing a processor to execute a method is provided. The method includes receiving information regarding characteristics of an asset. The method includes generating at least one digital asset representing fractional interests in the asset. The method includes facilitating establishment of a smart contract for exchanging the at least one digital asset held by a first entity for trade proceeds from a second entity. The method includes performing a transaction based on the smart contract. The method includes updating a capitalization table based on performing the transaction. The method includes recording data, pertaining to the transaction that is performed, on a primary ledger and a secondary ledger.

According to certain aspects of the present disclosure, a system is provided. The system includes one or more memories comprising instructions and one or more processors configured to execute the instructions which, when executed, cause the one or more processors to receive information regarding characteristics of a real asset. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to tokenize at least one digital asset representing fractional interests in the real asset. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to determine the initial share price. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to updating a capitalization table based on the number shares and share price. The one or more processors is configured to execute the instructions which, when executed, cause the one or more processors to performing a transaction based on share price.

According to other aspects of the present disclosure, a non-transitory machine-readable storage medium comprising machine-readable instructions for causing a processor to execute a method is provided. The method includes receiving information regarding characteristics of a real asset. The method includes tokenizing at least one digital asset representing fractional shares in the real asset. The method includes determining the initial share price. The method includes updating a capitalization table based on the number shares and share price. The method includes performing a transaction based on share price. Systems and machine-readable media are also provided.

BRIEF DESCRIPTION OF DRAWINGS

The disclosure is better understood with reference to the following drawings and description. The elements in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the disclosure. Moreover, in the figures, like-referenced numerals may designate to corresponding parts throughout the different views.

FIG. **1** is a block diagram illustrating an exemplary technological system including a transaction platform having semi-redundant ledgers.

FIG. **2** illustrates an exemplary process for tokenization of an asset, according to some embodiments of the disclosed technology.

FIG. **3** illustrates an exemplary process for user onboarding and account creation, according to some embodiments of the disclosed technology.

FIG. **4** illustrates an exemplary process for acquiring and transferring asset tokens on the transaction platform of FIG. **1**, according to some embodiments of the disclosed technology.

FIG. **5** illustrates an exemplary seller login and transaction flow using the exemplary transaction platform of the system of FIG. **1**.

FIG. **6** illustrates an exemplary buyer login and transaction flow **600** using the exemplary transaction platform of the system of FIG. **1**.

FIG. **7** illustrates an exemplary fee flow using the exemplary transaction platform of the system of FIG. **1**.

FIG. **8** depicts a block diagram of an example computer system in which embodiments described herein may be implemented.

FIGS. **9**A, **9**B, and **9**C collectively illustrate a flow of the fractionalization algorithm suitable for use with the exemplary transaction platform of the systems in FIGS. **1** and **5-7**.

In one or more implementations, not all of the depicted components in each figure may be required, and one or more

implementations may include additional components not shown in a figure. Variations in the arrangement and type of the components may be made without departing from the scope of the subject disclosure. Additional components, different components, or fewer components may be utilized within the scope of the subject disclosure.

DETAILED DESCRIPTION

The detailed description set forth below is intended as a description of various implementations and is not intended to represent the only implementations in which the subject technology may be practiced. As those skilled in the art would realize, the described implementations may be modified in various different ways, all without departing from the scope of the present disclosure. Accordingly, the drawings and description are to be regarded as illustrative in nature and not restrictive.

The platform of the system **100** may automatically create and dynamically update (e.g., maintain) capitalization tables of assets underlying tokens exchanged on the platform, thereby addressing a long-standing pain point in businesses having investors for whom such capitalization tables must be manually created and revised whenever ownership changes occur. The automatic creation and live syncing maintenance of capitalization tables may facilitate their being continually up to date, complete, verified, and audit-ready (e.g., dynamically updated). For example, the platform of the system **100** may provide owners with a list of new investors in a tokenized asset based on the updated capitalization table, reflecting every buyer of the investors' tokens representing an interest in the underlying asset. The platform may also provide value to the transfer side via improved efficiency and the reduction of manual pain points in their business. The ease and simplicity with which the systems and methods of the platform described herein may be applied in practice may provide compelling inducements for industries traditionally slow to adopt new technology, e.g., commercial real estate, to adopt the technology disclosed herein for facilitating transaction processing for the benefit of buyers and sellers of digital assets representing fractional ownership in underlying assets, via the platform of the system **100**, sponsors of investments in assets and/or owners of assets (e.g., real estate) may provide access to investments in such assets which may have previously been unavailable, for example, due to securities regulations and/or rules defining sophisticated and accredited investors. Retail investors and buyers of assets have traditionally been locked out of participating in commercial real estate investments because they lack the minimum investment threshold and/or do not have sufficient qualifications as traditional investors to acquire an interest in an asset from a Seller of the interest in the asset. The platform of the system **100** may establish a secondary exchange via which the asset tokens are exchanged in secondary trades, following any holding periods following the primary issuance of securities underlying the asset tokens as may be required by securities regulations (e.g., Rule **144**), so the restrictions of the securities regulations pertaining to qualifications of the investors may not apply to the contemplated exchange of asset tokens. For example, the platform of the system **100** may unlock real estate investment opportunities for retail buyers, not only facilitating retail buyers to capture return on investment, but also to take advantage of potential tax savings, for example, via write-offs of depreciation of the underlying assets on tax returns. The disclosed technology platform that can create digital securities out of what are known as "real assets" and can function as a secondary market platform or Financial Exchange for these types of assets as well as for other types of assets such as, but not limited to, investments in franchises, investments in business that generate dividends or returns based on performance of the business or underlying asset, investments in ventures that capture or mine natural resource such as, but not limited to uranium, timber, and other commodities, private credit, private debt, intangible assets, tradeable assets, and any other types of appropriate assets.

FIG. **1** is a block diagram illustrating an exemplary technological system **100** including a transaction platform having semi-redundant ledgers, such as primary ledger **102** and secondary ledger **104**. An owner **112**, a seller **114**, and a buyer **116** may each include computing and communication systems (e.g, an owner device, a seller device, and a buyer device, respectively) corresponding to and/or representing users interfacing with the system **100**. The owner **112** may be an owner of an asset listed on the transaction platform and/or a sponsor of investments in an asset listed on the transaction platform, and may also be referred to as an asset owner or a property owner. The seller **114** may represent one who is selling or listing an asset as available for sale or exchange, e.g., available to be transferred to another user in exchange for something else (e.g., tokens, currency, etc.). The seller **114** may also be referred to as a seller when participating in a buy-sell transaction, for example. The buyer **116** may represent one who is seeking to purchase, buy, or acquire at least a partial interest in an asset which is listed (e.g., as available for sale or exchange) on the transaction platform. The buyer **116** may also be referred to as a buyer when participating in a buy-sell transaction, for example. The system **100** may perform verification of identification and related information for each of the users of the system **100** (e.g., including owner **112**, seller **114**, and/or buyer **116**) via an online identity verification process, for example, a know your customer (KYC) verification process for an individual user, a know your business (KYB) verification process for any business entity, such as, but not limited to, limited liability company (LLC), C corporation, S corporation, and other appropriate business entities, and/or an anti-money laundering (AML) verification process. Each user of the system **100** may communicatively couple an electronic and/or computer-networked funding source and/or recipients of funds (e.g., financial institution account, bank account, credit union account, investment account, cryptocurrency account, digital wallet, and/or other provider or recipient of digital representations of currency and/or digital assets associated with a transaction processed by the transaction platform) to the system **100**. Digital assets may include, but is not limited to, cryptocurrencies, crypto tokens, crypto coins, security token, asset tokens, non-fungible tokens (NFTs), fungible tokens, and/or other appropriate forms of digital assets. The electronic and/or computer-networked funding source and/or recipients of funds may include a computing system of one or more third-party accounts of users of the system **100**. Sending and/or distributing fees and/or funds, receiving and/or collecting fees and/or funds, and exchanging assets for fees and/or funds as described herein may merely be illustrative examples of the technological systems and methods described herein which may be applied in addressing challenges in a variety of other contexts and applications, also. For example, the technological systems and methods described herein may provide novel systems and methods for transmitting and/or receiving transmissions of various types of digital content (e.g., digital bits and/or bytes stor-

able in a computer-readable memory of the system **100**) over a computing communication system associated with the system **100**. In various non-limiting examples, including those described herein, the digital content transmitted and/or received by components of the systems and methods described herein may include digital representations of currency, cryptocurrency, NFTs, and/or digital assets such as written works, artwork, photographs, audio/video programs, music, digital blueprints, computer-aided design (CAD) files representing physical articles of manufacture, architectural designs, plats of survey, deeds to real property, stock and/or membership interests in business entities, executed contracts, ownership and/or membership interests in timeshare properties, co-op properties, travel/vacation clubs, recreational clubs, social clubs, etc. Additional examples of content could be valuation estimates, third party appraisals, proof of purchases, copies of insurance policies, profit and loss data, calendars and schedules, and performance data.

The transaction platform may include the primary ledger **102**, a transfer agent **106**, backend servers **132**, and a website **134**. While the primary ledger **102** and the transfer agent **106** are depicted as separate, it should be understood that, in certain aspects, the primary ledger **102** and the transfer agent **106** are included within the same service. The users may interact with the website **134** via a web browser app executing on the owner **112**, the seller **114**, and the buyer **116**, all of which can be, but is not limited to, a desktop computer, laptop computer, tablet computer, personal digital assistant (PDA), cell phone, mobile phone, smart phone, and/or other computing devices including mobile devices. The transaction platform may be communicatively coupled with a transaction ATS broker/dealer module **130**, a pricing oracle 136, and a secondary ledger **104**. While, in some aspects, the primary ledger **102** is described as being centralized and the secondary ledger **104** as being decentralized, it should be understood that the primary ledger **102** could be decentralized. The primary ledger **102** and/or the secondary ledger **104** may be implemented with blockchain technology. The primary ledger **102** and secondary ledger **104** may be private or public. The primary ledger **102** and the secondary ledger **104** may include multiple copies of ledgers maintained on different computing nodes of computing networks implementing and/or supporting one or more public blockchain protocols, for example, but not limited to, Ethereum, Bitcoin, Binance Smart Chain (BSC), Cardano, Polkadot, Solana, Chainlink, Cosmos, TRON, HIVE, Polygon (Matic Network), and more.

In certain aspects, the primary ledger **102** can store all user personally identifiable information (PII) utilized by the system **100**, as well as a capitalization table (also referred to as a cap table) that maintains the status of platform assets and transactions, including the capitalization of each asset (e.g., real property) listed on the platform (e.g., listed as available for transactions on the platform). The primary ledger **102** may be implemented as a Structured Query Language (SQL) database, for example. In certain aspects, the primary ledger **102** can be maintained by the transfer agent **106**. The function of the transfer agent **106** may be unregulated. The transfer agent **106** may record transactions in the primary ledger **102**. The transfer agent **106** may synchronize the primary ledger **102** and the secondary ledger **104**. The transfer agent **106** may act as a gatekeeper and share information regarding transactions on the primary ledger **102** and/or the secondary ledger **104** only with authorized users and/or the transaction ATS broker/dealer module **130**.

The transaction ATS broker/dealer module **130** may include computing and communication systems corresponding to and/or representing a registered broker, registered dealer, registered broker/dealer licensed by the US Securities and Exchange Commission, the Financial Industry Regulatory Agency (FINRA), other domestic/international regulatory or governmental agencies, and/or similar roles in various exemplary applications and/or jurisdictions in which the system **100** is utilized. The transaction ATS broker/dealer module **130** may interface with the system **100** to provide associated broker/dealer functionality on the transaction platform of the system **100**. Functionality provided by the transaction ATS broker/dealer module **130** may be separate from functionality provided by other modules of the transaction platform, for example, due to regulatory requirements including those promulgated by the Financial Industry Regulatory Authority (FINRA). The transaction ATS broker/dealer module **130** may include an Alternative Trading System (ATS) and implementations (e.g., software, firmware, programmable logic arrays, electronic circuitry, etc.) of FINRA-compliant processes and methods for facilitating the transactions processed by the transaction platform as approved and licensed by FINRA. Functionality provided by the transaction ATS broker/dealer module **130** may be implemented in a virtual private cloud separate from other modules of the transaction platform. Firewalls may be established for the transaction ATS broker/dealer module **130** to be separate from and/or on a separate web services instance than other modules of the transaction platform. The transaction ATS broker/dealer module **130** may provide functionality to introduce buyers **116** and sellers **114** to each other, to generate smart contracts, to settle transactions facilitated by the transaction platform, distribute fees associated with the transactions facilitated by the transaction platform to appropriate participants in the system **100**, and/or to act as a gatekeeper of transactions facilitated by the transaction platform. Smart contracts are digital contracts that automatically execute, control or document events and actions according to the terms of a contract or an agreement. Fees generated from activities on the transaction platform during an acquisition/transfer transaction (e.g., buy-sell transaction, acquisition transaction, merger transaction, etc.) may be collected and/or distributed by the transaction ATS broker/dealer module **130**, for example, according to rules, agreements, and/or smart contracts associated with the transaction facilitated by the transaction platform. Fees generated from activities and/or participants of the system **100** outside the transaction ATS broker/dealer module **130** (e.g., from other participants of the transaction platform and/or any third-party system that is not included in the transaction platform of the system **100**) may be processed and collected by the transaction platform.

The transaction ATS broker/dealer module **130** may request payment of fees (e.g., fees associated with a transaction facilitated by the transaction platform of the system **100**) via third-party custody account(s) of the buyer **116**. The transaction ATS broker/dealer module **130** may deduct funds sufficient to cover the fees from proceeds of the transaction to pay seller fees (e.g., fees payable to the seller **114**) as stipulated by and/or agreed to by the seller **114** in a smart contract associated with the transaction as part of a process of listing a token as available for an exchange transaction facilitated by the transaction platform. A computing system of the third-party custody account(s) may send funds to cover the fees to the transaction ATS broker/dealer module **130** at which time the transaction ATS broker/dealer module **130** may keep the funds covering the fees. The transaction

ATS broker/dealer module **130** may disburse funds covering a licensing fee for the transaction platform to one or more entities due those fees. The transaction ATS broker/dealer module **130** may disburse funds covering a partnership fee to the transfer agent **106**. The transaction ATS broker/dealer module **130** may generate and/or distribute a final settlement statement to the buyer **116** and seller **114**. In the event of any errors, omissions, glitches, or problems associated with the transaction processed by the transaction platform, the transaction ATS broker/dealer module **130** may notify a designated third party of the event for appropriate remediation. The transaction ATS broker/dealer module **130** may include one or more maintenance and support modules via which remediation, updates, upgrades, and/or support may be provided via a third-party computing system communicatively coupled with the transaction ATS broker/dealer module **130**.

The pricing oracle 136 may include a third-party service that connects smart contracts in the transaction platform of the system **100** with third-party entities and third-party systems outside of the system **100**. The pricing oracle 136 may provide a user of the system **100** with an estimate of the current value of an asset. The pricing oracle 136 may facilitate calculations and computations based on the estimate as directed by the user. The user may modify inputs to the pricing oracle 136 to utilize the pricing oracle 136 for determining the user's own market pricing estimates. For example, the buyer **116** may modify inputs to the pricing oracle 136 to utilize the pricing oracle 136 for estimating a future value of their investment in an asset and determining an amount of funds the buyer **116** may agree to exchange for the asset on a given day. The seller **114** may transmit information indicating agreement with pricing data provided by the pricing oracle 136, or the seller **114** may transmit information that overrides the pricing data provided by the pricing oracle 136. For example, in the context of commercial real estate assets, the pricing oracle 136 may include a digital broker opinion of value (BOV).

In an example, an owner **112** (e.g., real estate property owner) may authenticate with the system **100** according to KYB KYC AML **118** protocols and methodologies. The owner **112** may link a bank account **140** and a currency custody module **142** to the system **100**. The currency custody module **142** may serve as a custodian for the owner **112**'s currency on the system **100**. The currency custody module **142** may be configured to hold fiat currency, for example, US dollars ($) or other forms of fiat currency. A platform digital wallet custody module **144** may serve as a custodian for the owner **112**'s digital assets on the system **100**.

In the example, a seller **114** may authenticate with the system **100** according to KYB KYC AML **120** protocols and methodologies. In some examples, the owner **112** and the seller **114** may be the same individual or entity playing the different roles in a transaction, while in other examples, the owner **112** and the seller **114** may be different individuals or entities, for example, if the seller **114** is a broker or agent engaged by the owner **112** to list and/or transfer the property on the transaction platform of the system **100** on their behalf. The seller **114** may link a bank account **148** and a currency custody module **150** to system **100**. The currency custody module **150** may serve as a custodian for the seller **114**'s fiat currency on the system **100**. A digital wallet custody module **157** may serve as a custodian for the seller **114**'s digital assets on the system **100**. These digital assets may include cryptocurrency, e.g., USDC tokens and any other crypto currencies. The digital wallet custody module **157** may authenticate with the system **100** according to wallet KYC 159 protocols and methodologies. The digital wallet custody module **157** may also include functionality and/or an interface to convert or exchange the digital currency held thereby into fiat currency for the benefit of the seller **114**. Conversions or exchanges of the cryptocurrency held by the digital wallet custody module **157** to fiat currency may be documented by a transaction entry in the primary ledger **102** and the secondary ledger **104**. A platform digital wallet custody module **152** may serve as a custodian for the seller **114**'s digital assets on the system **100**, including the digital assets which the seller **114** transfers on behalf of a separate owner (e.g., via a broker or agency relationship) and the digital assets which the seller **114** transfers on its own behalf as also owner **112** of the digital assets.

An asset tokenization module **108** may generate one or more digital assets representing an asset and/or a value of an asset, for example, a real estate property owned by the owner **112**, and store the generated digital assets in an asset wallet custody module **146**. The asset wallet custody module **146** may transmit data to the primary ledger **102** and the secondary ledger **104** for recording the generation of the digital assets on the secondary ledger **104**. The asset wallet custody module **146** may transmit the digital assets to the owner **112**'s platform digital wallet custody module **144** and provide data to the transfer agent **106** to record in the primary ledger **102** regarding the creation and/or transfer of the digital assets generated by the asset tokenization module **108**. The asset wallet custody module **146** may transmit an invitation to the seller **114** to claim the digital assets generated by the asset tokenization module **108**. When the seller **114** claims or retrieves its associated portion of the digital assets generated by the asset tokenization module **108** that is stored in the asset wallet custody module **146**, for example, if the seller **114** is going to trade its associated portion of the digital assets generated by the asset tokenization module **108** on the system **100**, then the asset wallet custody module **146** may transmit the digital assets to the seller **114**'s platform digital wallet custody module **152** and transmit information regarding the transfer to the transfer agent **106** for recording on the primary ledger **102**. In certain other aspects, instead of transmitting an invitation to the seller **114**, the asset wallet custody module **146** can transmit the digital assets generated by the asset tokenization module **108** directly to the seller **114**'s asset wallet custody module **146**.

In an example, a buyer **116** may authenticate with the system **100** according to KYB KYC AML **122** protocols and methodologies. The buyer **116** may link a bank account **154** and a currency custody module **156** to the system **100**. The currency custody module **156** may serve as a custodian for the buyer **116**'s fiat currency on the system **100**. A digital wallet custody module **158** may serve as a custodian for the buyer **116**'s digital assets on the system **100**. These digital assets may include cryptocurrency, e.g., USDC tokens and any other crypto currencies. The digital wallet custody module **158** may authenticate with the system **100** according to wallet KYC 160 protocols and methodologies. The digital wallet custody module **158** may also include functionality and/or an interface to convert or exchange the digital currency held thereby into fiat currency for the benefit of the buyer **116**. Conversions or exchanges of the cryptocurrency held by the digital wallet custody module **158** to fiat currency may be documented by a transaction entry in the secondary ledger **104**. A platform digital wallet custody module **162** may serve as a custodian for the buyer **116**'s

digital assets on the system **100**, for example, shares in tokenized assets generated by the asset tokenization module **108**.

In an example, the buyer **116** may see that the seller **114** has listed its associated portion the digital assets generated by the asset tokenization module **108** that is stored in the asset wallet custody module **146** represented by one or more digital assets on the website **134** and engages in a transaction processed by the system **100** to exchange currency via the currency custody module **156** and/or digital assets via the digital wallet custody module **158** for digital assets generated by the asset tokenization module **108** representing the asset in which the buyer **116** is interested. The seller **114** may receive currency and/or digital assets from the buyer **116**'s currency custody module **156** and/or digital wallet custody module **158**, while the buyer **116** may receive digital assets, representing the asset from the seller **114**'s platform digital wallet custody module **152**, into the buyer **116**'s platform digital wallet custody module **162**. Data regarding the transfer may be transmitted to the transfer agent **106** for recording on the primary ledger **102** as well as on the secondary ledger **104**.

FIG. **2** illustrates an exemplary process **200** for tokenization of an asset, according to some embodiments of the disclosed technology. There are two types of participants in the process **200**. One is an owner, (e.g., an asset holder), such as the owner **112**, who may also be referred to as a sponsor or general partner (GP). The other is an investor, also referred to as a limited partner (LP). The investor may be a current investor in the asset or an investor who wants to invest in the asset. The investor may also be referred to as the buyer, such as the buyer **116**.

Initially (e.g., at or prior to "START"), the participants (e.g., users) may be onboarded with the system **100** as discussed with reference to FIG. **1**, and the process **200** that the participants undergo to become onboarded with the system **100** is described in detail below. For example, the owner (e.g., may be GP) may undergo a KYB process and a KYC account for the owner **112** may be created with the system **100** (operation **202**). The owner **112** may approve sale of the asset using the system **100** (operation **204**) to generate a smart contract memorializing agreement to sell and list. After the owner **112** agrees to tokenize an asset (operation **206**), the system **100** may tokenize the asset as security tokens (operation **208**), for example, or as other digital assets including, but is not limited to, nonfungible tokens (NFTs), fungible tokens, hybrid tokens, cryptocurrencies, crypto tokens, crypto coins, security token, and asset tokens, having metadata including identification information of the buyer of the NFTs. The security tokens may include, for example, ERC **1400** tokens. The security tokens may be fungible tokens or non-fungible tokens, which are unique and differentiated from other tokens representing a share of value in the asset, and may store associated meta data. In various examples, other digital asset types may be used. The security tokens created may include tokens designated as being owned by the GP and tokens owned by each of the investors or LPs who also hold an interest in the asset.

In the example of FIG. **2**, an asset having a net value of $1,000,000 may be tokenized as 1,000 tokens, each token having a value of $1,000. In this example, the net value of the asset may be taken into account any debt by which the asset is burdened. In other words, an asset having a market value of $2,000,000, and a mortgage securing a debt of $1,000,000 recorded as a lien against the asset, may have a net value of $1,000,000. An asset having a market value of $1,000,000, and no debt against the asset, may have a net value of $1,000,000.

These tokens may be sent by the transfer agent **106** to a platform digital wallet, such as the platform digital wallet custody module **152**, created for the asset (operation **210**), and the capitalization table for the asset may be updated by the transfer agent **106** to reflect moving the tokens (operation **224**). An identification number (ID) identifying the unique tokens may be included in the capitalization table along with the token's owner or investor's identification information. The platform digital wallet may be held by the system **100** or a third party.

The system **100** may invite the GP to claim the tokens (operation **212**). When the GP claims the tokens, they may be moved from the platform wallet to the GP's digital wallet (operation **214**), and the capitalization table may be updated to reflect the move (operation **224**). The tokens claimed by the GP are only the GP's tokens, not investors' (LP's) tokens. The GP may then invite the investors (LPs) to claim their tokens (operation **216**). Once the LPs claim their tokens, the LPs may be free to conduct transactions on the system **100** using the tokens, for example, transferring their tokens or exchanging their tokens for other items of value, for example, other tokens representing interests in other assets. If an LP who wishes to claim their tokens is not registered or onboarded onto the system **100**, the LP may undergo a KYC process to create an investor account with the platform on the system **100** (operation **218**) and create the LP's digital wallet (operation **220**). The LPs may then claim their tokens, which may then be moved from the platform asset digital wallet (which may have been holding the tokens since they were created in operation **208**) to the LP wallets (operation **222**), and the capitalization table may be updated to reflect the moves (operation **224**). For example, the capitalization table may associate the token identifiers (IDs) with the names of the LPs.

When the capitalization table is updated (operation **224**), the capitalization table may be updated in the primary ledger on the blockchain by the system **100**. The system **100** may also update the secondary ledger to match the primary ledger. PII about the GP or LPs may be withheld from and not stored in the secondary ledger. For example, instead of an LP name, the secondary ledger may associate token IDs with a hash value that is unique to the LP. In this manner, the blockchain transaction may be linked to the LP, while the LP may remain anonymous. The primary and secondary ledgers **102**, **104** may be correlated using a database within the platform of the system **100**.

FIG. **3** illustrates an exemplary process **300** for user (e.g., the owner **112**, the seller **114**, or the buyer **116**) onboarding and account creation, according to some embodiments of the disclosed technology. For a new user, e.g., the owner **112**, the seller **114**, or the buyer **116**, the platform of the system **100** may first perform a light account creation with the user's name, email address, and password (operation **302**). The platform may then verify the user's email address (operation **304**), for example, by emailing a verification link to the user's email address, which the user may click or follow to verify the user's email address with the platform.

After successful email verification, the platform of the system **100** may perform a level 1 account creation for the user (operation **306**). The level 1 account may provide limited access to the exchange, for example, authorizing the user to browse tokenized assets, but not to acquire or exchange the tokens created to represent the tokenized assets.

A user may gain level 2 access by successfully completing the KYB/KYC/AML process (operation **308**). The platform may create a level 2 access account for the user to provide the user with full exchange access (operation **310**), which may include all access of the level 1 access plus full access to the exchange, for example, authorizing the user to acquire and/or exchange tokens created to represent tokenized assets. Upon successful completion of the KYB/KYC/AML process, the platform of the system **100** may also create multiple digital wallets or financial holdings accounts for the user, for example: a digital security wallet to hold digital assets (operation **312**), a fiat account to hold fiat currency (operation **314**), and a digital currency wallet to hold cryptocurrency tokens (operation **318**). The user's digital currency wallet may receive and/or transmit cryptocurrency tokens from/to digital currency wallets and/or accounts off of the platform of the system **100**. The user may fund the user's fiat account, for example, via an ACH transfer or ACH exchange with a bank (operation **316**). The user may also transfer fiat currency from the user's fiat account on the platform of the system **100** to a bank external to the system **100** via an ACH transfer (operation **316**).

With reference to operation **318**, the level 2 account may facilitate the user (e.g., the buyer **116**) to acquire and exchange tokens on the platform of the system **100**. When the user (e.g., the buyer **116**) acquires an asset token from a seller **114**, funds may be transferred out of the user's (e.g., buyer's) fiat account (e.g., the currency custody module **156**) and/or the digital wallet custody module **158** to the seller's fiat account (e.g., the currency custody module **150**) and/or the digital wallet custody module **157**, respectively, and the asset token may be moved from the owner's or seller's digital wallet for security tokens (e.g., platform digital wallet custody module **144** and platform digital wallet custody module **152**, respectively) to the user's digital token wallet (e.g., platform digital wallet custody module **162**). When the user (e.g., the seller **114**) transfers an asset token to a buyer **116**, funds may be transferred into the user's fiat account (e.g., the seller **114**'s currency custody module **150**) from the buyer's fiat account (e.g., the currency custody module **156**), and the asset token may be moved out of the user's token wallet (e.g., the seller **114**'s platform digital wallet custody module **152**) and into the buyer's token wallet (e.g., the platform digital wallet custody module **162**). In certain aspects, the user's account(s) on the platform of the system **100** may earn dividends, and the earned dividends may be moved into the user's fiat account when in the form of fiat currency or into the user's digital currency wallet when in the form of a cryptocurrency. Note that on the platform of the system **100**, asset tokens may be purchased by and/or sold for any or a variety different forms of fiat currency and/or cryptocurrency, or combinations thereof. Likewise, in such aspects, the dividends may be earned and paid to a user's account in a variety different forms of fiat currency and/or cryptocurrency, or combinations thereof.

Some users may purchase asset tokens using cryptocurrency, as described in detail below. Such a user may first successfully complete a wallet know-your-transaction (KYT) process, such as a security process, and address screen (operation **320**) to ensure the authenticity and security of the user's existing cryptocurrency. The platform of the system **100** may then connect the digital currency wallet to an external cryptocurrency digital wallet for the user (operation **322**) based on determining that the authenticity and security are proper. The user may then transfer cryptocurrency from an off-platform digital wallet to the user's on-platform cryptocurrency digital wallet. In certain aspects, the security process is continually monitoring the digital currency wallet to determine proper authenticity and security.

When the user acquires an asset token on the platform of the system **100** using cryptocurrency, cryptocurrency may be transferred from the user's crypto wallet to the platform crypto wallet and the asset token may be moved to the user's token wallet. When the user transfers an asset token on the platform of the system **100** using cryptocurrency, cryptocurrency may be transferred into the user's crypto wallet from the platform crypto wallet and the asset token may be moved out of the user token wallet. In either case, the platform may settle the transaction with the counterparty, either in cryptocurrency or fiat currency.

FIG. **4** illustrates an exemplary process **400** for acquiring and transferring asset tokens on the transaction platform of the system **100**, according to some embodiments of the disclosed technology. A first investor (illustrated at block **402**), referred to herein as the "seller," such as the seller **114**, holds an asset token in the seller's asset wallet (e.g., the platform digital wallet custody module **152**), as depicted at block **432**. The seller **114** requests (**404**) the asset token be listed for sale on the exchange, as illustrated at block **408**. In response, the platform informs the broker/dealer (at block **416**), such as the transaction ATS broker/dealer module **130**, which generates a corresponding seller smart contract, and sends that seller smart contract to the seller for acceptance (shown at **406**).

A second investor (depicted at block **414**), referred to herein as the "buyer," such as the buyer **116**, agrees (at **410**) to acquire the asset token. In response, the platform informs the broker/dealer (at block **416**), which generates a corresponding buyer smart contract, and sends (at **412**) that buyer smart contract to the buyer (depicted at block **414**) for acceptance.

The broker/dealer (at block **416**) may perform a verification of funds available in the buyer's accounts, for example, to ensure that the buyer has a sufficiently high balance to complete the transaction. If not, the platform of the system **100** may send the buyer a request to add additional currency (e.g., fiat currency, cryptocurrency, tokens, and/or other digital representations of value offered to complete the transaction) to their platform account(s) being used to provide items of sufficient value in exchange for the acquisition. The platform of the system **100** may send a release request (at **418**) to the buyer's fiat account (block **422**), such as the currency custody module **156**, to transfer the required amount of fiat currency from the buyer's fiat account (block **422**) to the seller's fiat account (block **423**), such as the currency custody module **150** via currency transfers (**424**). The purchase price amount may be transferred from the buyer's fiat account to the seller's fiat account, minus a service fee (at **420**) associated with the acquisition. For example, if there was a purchase of $1000 and a fee of $50, there would be a transfer of $950 from the buyer's fiat account to the seller's fiat account, and a transfer of $50 from the buyer's fiat account to the broker dealer (at block **416**). A service fee may be transferred from the buyer's fiat account to the broker/dealer. On receipt of the required amount into the seller's fiat account (at block **423**), the platform may inform the broker/dealer.

Process steps may be taken to protect the token from being transferred to another other than the buyer during the process of the buyer acquiring the token, being delisted from the platform, or otherwise being tampered or interfered with during the process of the buyer acquiring the token. For

example, at approximately the same time as the release request (at **418**) sent by the platform to the buyer's fiat account (at block **422**), a second release request (at **434**) may be sent to the seller's asset token wallet (at block **432**) to hold the asset token for the buyer. This process may protect the buyer's currency by ensuring the buyer receives the asset token in exchange for the currency transferred to the seller of the asset token, by preventing the seller from interrupting the transfer of the asset token once the seller has accepted the terms to transfer the asset token. On receipt of the agreed-upon amount of currency (e.g., fiat currency, cryptocurrency, etc.) into the seller's corresponding account, the platform of the system **100** may transmit a confirmation of receipt to the seller's asset token wallet. In response to receiving the confirmation of receipt of the currency, the seller's asset token wallet (at block **432**) may transfer (at **436**) the asset token to the buyer's asset token wallet (at block **438**), such as the platform digital wallet custody module **162**. Upon receipt of the asset token, the buyer's asset token wallet (at block **438**) may transmit (at **440**) confirmation of receipt of the asset token to the broker/dealer (at block **416**), thereby completing the transaction. The platform of the system **100** may update the capitalization table in the primary ledger, such as the primary ledger **102** (shown in FIG. **1**), to reflect the transaction, and update the secondary ledger, such as the secondary ledger **104** (shown in FIG. **1**), accordingly.

Although the acquire/transfer process has been described herein largely in terms of the exchange of fiat currency, either or both of the buyer and seller may use other digital representations of value (e.g., cryptocurrency or other digital tokens) instead of, or in addition to, fiat currency. The platform of the system **100** may perform any conversions (at **454**) between fiat currency, cryptocurrency, and/or other digital tokens as appropriate to facilitate and complete the transactions (**444**, **446**) on the transaction platform of the system **100**.

FIG. **5** illustrates an exemplary seller login and transaction flow **500** using the exemplary transaction platform of the system **100**. A seller **114** may register with and log into the system **100** and be authenticated as an authorized user of the system **100** according to KYB KYC AML **120** protocols and methodologies. The seller **114** may link a bank account **148** and a currency custody module **150** to system **100**. The currency custody module **150** may serve as a custodian for the seller **114**'s fiat currency on the system **100**. A platform digital wallet custody module **152** may serve as a custodian for the seller **114**'s digital assets on the system **100**. The seller **114** may receive, from the asset wallet custody module **146**, an invitation **505** to claim digital assets generated by the asset tokenization module **108** to represent investors' shares in an asset tokenized by the asset tokenization module **108**. An example of such an asset may include real property, e.g., commercial real estate. When the seller **114** claims the digital assets generated by the asset tokenization module **108**, for example, if the seller **114** is going to trade the digital crypto tokens generated by the asset tokenization module **108** on the system **100**, the asset wallet custody module **146** may transmit the digital assets to the seller **114**'s platform digital wallet custody module **152** and transmit information regarding the transfer to the transfer agent **106** for recording on the primary ledger **102** as well as on the secondary ledger **104** without recording any PII thereon.

The seller **114** may then list **510** the asset and/or asset tokens on the transaction platform of the system **100** as being available for sale, purchase, exchange, investing in, transferring, or any other appropriate listing action. The seller **114** may list **510** the asset and/or asset tokens via the website **134**, for example, using the website **134** as an interface to the transaction platform of the system **100** to make the listing. The website **134** may include a list of assets and/or asset tokens that are available on the transaction platform, and the act of listing **510** the asset and/or asset tokens may include the listed asset and/or asset tokens in the website **134**'s list of assets and/or asset tokens that are available on the transaction platform.

Responsive to the listing **510** of the asset and/or asset tokens via the website **134**, a sell order **515** may be generated by the website **134**, the backend servers **132** (which may host or control at least some aspects of the website **134**), and/or a combination of the website **134** and the backend servers **132** in conjunction with one another. The sell order may be an order to request creation of a smart contract (SC) **525** to facilitate a sale, purchase, exchange, investment in, transferring of, or similar type of disposition of the asset and/or asset tokens. In response to receiving the sell order **515**, the backend servers **132** may generate and transmit a sell SC request **520** to the transaction ATS broker/dealer module **130** to request the creation of the SC **525** between the transaction ATS broker/dealer module **130** and the seller **114**. The transaction ATS broker/dealer module **130** may establish the SC **525** with the seller **114** for the contemplated transaction involving the asset and/or asset tokens transferred to the platform digital wallet custody module **152**. The transaction ATS broker/dealer module **130** may record the smart contract (operation **530**) and update and/or validate the capitalization (cap) table (operation **535**) via the transfer agent **106**, for example, based on the SC **525** and/or the asset tokens transferred to the platform digital wallet custody module **152** by the asset wallet custody module **146**. The transfer agent **106** may include and/or utilize user PII of the seller **114** and/or the owner **112** in the update and/or validation of the cap table. The transfer agent **106** may maintain an up-to-date copy of the cap table and related user PII. The transfer agent **106** may update the cap table and/or related user PII based on input provided via the website **134** and routed to the transfer agent **106** via the backend servers **132** and/or transaction ATS broker/dealer module **130**. The transfer agent **106** records the smart contract **525** as well as entries pertaining to the contemplated and performed transactions involving the asset and/or asset tokens in both the primary ledger **102** and the secondary ledger **104**.

FIG. **6** illustrates an exemplary buyer login and transaction flow **600** using the exemplary transaction platform of the system **100**. A buyer **116** may register with and log into the system **100** and be authenticated as an authorized user of the system **100** according to KYB KYC AML **122** protocols and methodologies. The buyer **116** may link a bank account **154** and a currency custody module **156** to system **100**. The currency custody module **156** may serve as a custodian for the buyer **116**'s fiat currency on the system **100**. A digital wallet custody module **158** may serve as a custodian for the buyer **116**'s digital assets on the system **100**. These digital assets may include cryptocurrency, e.g., USDC tokens and/or other appropriate digital assets. The digital wallet custody module **158** may authenticate with the system **100** according to wallet KYC 160 protocols and methodologies. The digital wallet custody module **158** may also include functionality and/or an interface to convert or exchange the digital currency held thereby into fiat currency for the benefit of the buyer **116**, if desired. Conversions or exchanges of the cryptocurrency held by the digital wallet custody module **158** to fiat currency may be documented by a transaction entry in the both the primary ledger **102** and the secondary

ledger **104**. A platform digital wallet custody module **162** may serve as a custodian for the buyer's asset tokens to be acquired on the system **100** by the buyer **116**.

The buyer **116** may view the listed asset and/or asset tokens on the transaction platform of the system **100** as being available for sale, purchase, exchange, investing in, transferring, or the like via the website **134**. Responsive to viewing the listing of the asset and/or asset tokens via the website **134**, the buyer **116** may make an offer to buy **605** the listed asset and/or asset tokens via the website **134**. Responsive to the buyer **116**'s offer to buy **605** the listed asset and/or asset tokens, a buy order **610** may be generated by the website **134**, the backend servers **132** (which may host or control at least some aspects of the website **134**), and/or a combination of the website **134** and the backend servers **132** in conjunction with one another. The buy order **610** may be an order to request creation of a create a smart contract (SC) **615** to facilitate a sale, purchase, exchange, investment in, transferring of, or similar type of disposition of the asset and/or asset tokens. In response to receiving the buy order **610**, the backend servers **132** may generate and transmit a buy SC request **620** to the transaction ATS broker/dealer module **130** to request the creation of the SC **615** between the transaction ATS broker/dealer module **130** and the buyer **116**. The transaction ATS broker/dealer module **130** may establish the SC **615** with the buyer **116** for the contemplated transaction involving the asset and/or asset tokens transferred to the platform digital wallet custody module **152**.

The transaction ATS broker/dealer module **130** may perform on the SC **615** by transmitting message(s) instructing the digital wallet custody module **158** and the currency custody module **156** to release the buyer **116**'s funds and/or tokens to be exchanged for the seller **114**'s asset tokens while also transmitting message(s) instructing the platform digital wallet custody module **152** to release the seller **114**'s asset tokens to be exchanged for the buyer **116**'s funds and/or tokens (operation **625**). Responsive to receiving the message from the transaction ATS broker/dealer module **130**, the seller **114**'s platform digital wallet custody module **152** may transmit the asset token(s) to the buyer **116**'s platform digital wallet custody module **162** and/or currency custody module **156** may transmit trade proceeds **630** being exchanged for the asset token(s) to the seller **114**'s currency custody module **150** per the terms of the smart contract **615**. The trade proceeds **630** may include cryptocurrency, cryptocurrency converted to fiat currency, and/or fiat currency. In certain aspects, the digital wallet custody module **158** may include or interface with a module configured to convert cryptocurrency (e.g., USDC) which may be held by the digital wallet custody module **158** into fiat currency acceptable by the seller **114**'s currency custody module **150**. The digital wallet custody module **158** can, alternatively or additionally, transmit trade proceeds being exchanged for the asset token(s) that are held in crypto to the seller **114**'s digital wallet custody module **157**. The secondary ledger **104** may create and store a blockchain entry corresponding to the transfer of the trade proceeds from the buyer **116**'s currency custody module **156** and/or digital wallet custody module **158** to the seller **114**'s currency custody module **150** and/or digital wallet custody module **157**, respectively. In certain aspects, the seller **114** may also have, included within or coupled with the system **100**, the digital wallet custody module **157** to receive and hold digital assets such as cryptocurrency in addition to or in place of fiat currency in exchange for asset tokens. In such aspects, the buyer **116**'s digital wallet custody module **158** may not convert cryptocurrency funds into fiat currency when transmitting the trade proceeds **630** to the seller **114**'s digital wallet custody module **157**. In certain aspects, the seller **114**'s digital wallet custody module **157** can similarly include or interface with a module configured to convert cryptocurrency (e.g., USDC) which may be held by the digital wallet custody module **157** into fiat currency acceptable by the buyer **116**'s currency custody module **156**. Responsive to receiving the message from the transaction ATS broker/dealer module **130**, the seller **114**'s platform digital wallet custody module **152** may transmit the asset token(s) **635** to the buyer **116**'s platform digital wallet custody module **162** per the terms of the smart contract **615**. The secondary ledger **104** may create and store a blockchain entry corresponding to the transfer of the asset token(s) **635**.

The transaction ATS broker/dealer module **130** may record the smart contract and transaction (operation **640**) and update and/or validate the capitalization (cap) table (operation **645**) via the transfer agent **106**, for example, based on the SC **615**, the trade proceeds transferred to the seller **114**'s currency custody module **150** and/or digital wallet custody module (not shown), and/or the asset tokens **635** transferred to the buyer **116**'s platform digital wallet custody module **162** by the seller **114**'s platform digital wallet custody module **152**. The transfer agent **106** may include and/or utilize user PII of the buyer **116**, the seller **114**, and/or the owner **112** in the update and/or validation of the cap table. The transfer agent **106** may maintain an up-to-date copy of the cap table and related user PII. The transfer agent **106** may update the cap table and/or related user PII based on input provided via the website **134** and routed to the transfer agent **106** via the backend servers **132** and/or transaction ATS broker/dealer module **130**. The transfer agent **106** may also record entries pertaining to the contemplated and performed transactions involving the asset and/or asset tokens in the primary ledger **102** and/or secondary ledger **104**.

FIG. **7** illustrates an exemplary fee flow **700** using the exemplary transaction platform of the system **100**. As the trade proceeds are being transferred on the transaction platform of the system **100** as illustrated in FIGS. **5-6**, the transaction ATS broker/dealer module **130** transmits requests to buyer **116**'s currency custody module **156** and/or digital wallet custody module **158** as well as to the seller **114**'s currency custody module **150** and/or digital wallet custody module **157** to collect the transaction fees **715** for distribution. The transactions fees **715** can include, but is not limited to, licensing fees **710** distributed to the transaction ATS broker/dealer module **130**, partnership fees distributed to the transfer agent **106**, and other appropriate fees. The transaction ATS broker/dealer module **130** may then receive the transaction fees **715** associated with the transaction completed on the transaction platform of the system **100** from the buyer **116**'s currency custody module **156** and/or digital wallet custody module **158** as well as to the seller **114**'s currency custody module **150** and/or digital wallet custody module **157**. The transaction fees **715** may be payable and funded via fiat currency and/or cryptocurrency, for example, as described above. In some examples, the transaction fees **715** may be payable and funded by other digital assets, for example, NFTs. Moreover, transaction ATS broker/dealer module **130** transmits settlement statements **705** to the seller **114** and/or the buyer **116**. The transfer of the transaction fees **715** may be recorded on both the primary ledger **102** and the secondary ledger **104**. While the example illustrated in FIG. **7** shows that the transaction fees **715** are payable by and transferred to the transaction ATS broker/dealer **130**, this is merely an example, and in

other examples, the transaction fees **715** may be payable by and transferred to the transaction ATS broker/dealer module **130** by any combination of the owner **112**, the seller **114**, the buyer **116**, and/or third parties outside the system **100**, and/or their associated currency custody modules, digital custody modules, platform wallet custody modules, asset wallet custody modules, and/or the like.

The transaction ATS broker/dealer module **130** may distribute the license fees **710** associated with the transaction completed on the transaction platform of the system **100** to those owed the license fees **710**, such as the transaction ATS broker/dealer module **130**. Examples of license fees may include royalties, service fees, intellectual property license fees, and software license fees for software, systems, and methods used by the system **100** to complete the transactions. The license fees **710** may be funded from the transaction fees **715** received by the transaction ATS broker/dealer module **130**.

The disclosed technologies provide numerous advantages over conventional systems. For example, the platform of the system **100** may provide owners and sellers with the ability to exit a commercial real estate investment (as an asset) much earlier than the typical hold period for such asset types. In most commercial real estate investments, investors may hold the asset for five to seven (5 to 7) years for various reasons associated with processes and procedures for transferring ownership of the asset as a whole. At the end of the hold period (which may be mandated by statute, regulation, or other law, for example, SEC Rule **144**), the owner of an investment property (e.g., commercial real estate) may typically either transfer the property or refinance the property. Refinancing the property may provide a liquidity event to the investor. A technological system and method for fractionalizing and tokenizing such assets as described herein may provide owners of assets that would otherwise be subject to extended hold periods the ability to participate in liquidity opportunities and/or offer liquidity opportunities to their investors on a shorter timeline than with conventional legal processes, which may by and large be manually executed with extended delays. The technologies disclosed herein facilitate sellers in trading asset tokens and monetizing their investments in underlying assets, thereby unlocking an ability to re-invest capital and supporting the cycle of investment. For example, liquidity provided by the disclosed technology of the platform of the system **100**, even after just one year, may help create at least five to seven (5-7) times the liquidity in the entire ecosphere compared to traditional approaches. As an example, compared to traditional approaches in which a share of a real estate investment property is held for five (5) years, the technology disclosed herein may facilitate the asset tokens being traded five (5), ten (10), one hundred (100), or more times, for example, within the same five years.

FIG. **8** depicts a block diagram of an example computer system **800** in which embodiments described herein may be implemented. The computer system **800** may include a bus **802** or other electronic communication mechanism for communicating information, and one or more hardware processors **804** coupled with the bus **802** for processing information. The hardware processor(s) **804** may include, for example, one or more general purpose microprocessors and/or application specific integrated circuits (ASICs) configured to perform the processes and methods described herein and related processes and methods.

The computer system **800** also may include a main memory **806**, for example, a random access memory (RAM), cache, and/or other dynamic storage devices, coupled to the bus **802** for storing information and instructions to be executed by the processor(s) **804**. The main memory **806** also may be used for storing temporary variables or other intermediate information during execution of instructions to be executed by the processor(s) **804**. Such instructions, when stored in storage media accessible to the processor(s) **804**, may render computer system **800** into a special-purpose machine that is customized to perform the operations specified in the instructions.

The computer system **800** may further include a read only memory (ROM) **808** and/or other static storage device coupled to the bus **802** for storing static information and instructions for the processor(s) **804**. A storage device **810**, for example, a magnetic disk, optical disk, and/or USB thumb drive (Flash drive), etc., may be provided and coupled to the bus **802** for storing information and instructions.

The computer system **800** may be coupled via the bus **802** to a display **812**, for example, a liquid crystal display (LCD), light emitting diode (LED) display, touch screen, and/or other electronic display for displaying information to a computer user. One or more input device(s) **814**, including alphanumeric and/or other keys, may be coupled to the bus **802** for communicating information and command selections to the processor(s) **804**. Another type of user input device may include cursor control **816**, for example, a mouse, a trackball, a touchpad, and/or a set of cursor direction keys for communicating direction information and command selections to the processor(s) **804** and for controlling cursor movement on the display **812**. In some examples, direction information and command selections as may be provided by cursor control may also or alternatively be implemented via receiving touches on a touch screen without the use of a separate cursor control device.

The computing system **800** may include a user interface module to implement a graphical user interface (GUI) that may be stored in a mass storage device as executable software codes that are executed by the computing device(s). This and other modules may include, by way of example, components, such as software components, object-oriented software components, class components and task components, processes, functions, attributes, procedures, subroutines, segments of program code, drivers, firmware, microcode, circuitry, data, databases, data structures, tables, arrays, and variables.

In general, the words "component," "engine," "system," "database," "data store," and the like, as used herein, may refer to logic embodied in hardware or firmware, or to a collection of software instructions, possibly having entry and exit points, written in a programming language, such as, for example, Java, C, or C++. A software component may be compiled and linked into an executable program, installed in a dynamic link library, or may be written in an interpreted programming language such as, for example, BASIC, Perl, or Python. It will be appreciated that software components may be callable from other components or from themselves, and/or may be invoked in response to detected events or interrupts. Software components configured for execution on computing devices may be provided on a computer readable medium, such as a compact disc, digital video disc, flash drive, magnetic disc, or any other tangible medium, or as a digital download (and may be originally stored in a compressed or installable format that requires installation, decompression, and/or decryption prior to execution). Such software code may be stored, partially or fully, on a memory device of the executing computing device, for execution by the computing device. Software instructions may be embed-

ded in firmware, such as an EPROM. It will be further appreciated that hardware components may be comprised of connected logic units, such as gates and flip-flops, and/or may be comprised of programmable units, such as programmable gate arrays or processors.

The computer system **800** may implement the techniques described herein using customized hard-wired logic, one or more ASICs or FPGAs, firmware and/or program logic which in combination with the computer system causes or programs computer system **800** to be a special-purpose machine. According to one embodiment, the techniques herein are performed by computer system **800** in response to processor(s) **804** executing one or more sequences of one or more instructions contained in main memory **806**. Such instructions may be read into main memory **806** from another storage medium, such as storage device **810**. Execution of the sequences of instructions contained in main memory **806** may cause the processor(s) **804** to perform the process steps and/or operations described herein. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions.

The term "non-transitory media," and similar terms, as used herein refers to any non-transitory media that store data and/or instructions that cause a machine to operate in a specific fashion. Such non-transitory media may comprise non-volatile media and/or volatile media. Non-volatile media includes, for example, optical or magnetic disks, such as storage device **810**. Volatile media includes dynamic memory, such as main memory **806**. Common forms of non-transitory media include, for example, a floppy disk, a flexible disk, hard disk, solid state drive, magnetic tape, or any other magnetic data storage medium, a CD-ROM, any other optical data storage medium, any physical medium with patterns of holes, a RAM, a PROM, and EPROM, a FLASH-EPROM, NVRAM, any other memory chip or cartridge, and networked versions of the same.

Non-transitory media is distinct from but may be used in conjunction with transmission media. Transmission media participates in transferring information between non-transitory media. For example, transmission media includes coaxial cables, copper wire and fiber optics, including the wires that comprise bus **802**. Transmission media may also take the form of acoustic or light waves, such as those generated during radio-wave and infra-red data communications.

The computer system **800** may also include one or more communication network interface(s) **818** coupled to the bus **802**. The network interface(s) **818** may provide two-way data communication coupling to one or more network links that are connected to one or more local networks. For example, the network interface(s) **818** may include an integrated services digital network (ISDN) card, cable modem, satellite modem, or a modem to provide a data communication connection to a corresponding type of telephone line. As another example, the network interface(s) **818** may include a local area network (LAN) card to provide a data communication connection to a compatible LAN (and/or a wide area network (WAN) component to communicate with a WAN). Wireless links may also be implemented. In any such implementation, the network interface(s) **818** send and receive electrical, electromagnetic, and/or optical signals that carry digital data streams representing various types of information.

A network link typically provides data communication through one or more networks to other data devices. For example, a network link may provide a connection through a local network to a host computer or to data equipment operated by an Internet Service Provider (ISP). The ISP in turn may provide data communication services through the worldwide packet data communication network now commonly referred to as the "Internet." Local network and Internet both use electrical, electromagnetic, and/or optical signals that carry digital data streams. The signals through the various networks and the signals on network link and through network interface(s) **818**, which may carry the digital data to and from the computer system **800**, are example forms of transmission media.

The computer system **800** may send messages and receive data, including program code, through the network(s), network link and network interface(s) **818**. In the Internet example, a server might transmit a requested code for an application program through the Internet, the ISP, the local network, and the network interface(s) **818**.

The received code may be executed by the processor(s) **804** as it is received, and/or stored in the storage **810**, or other non-volatile storage for later execution.

In certain aspects, the system **100** provides a novel algorithm that can be used to fractionalize a real asset in the most efficient way (based, at least, on given share price parameters). Using the algorithm, the asset tokenization module **100** of the system **100**, for example, takes a real asset (that has an associated equity investment, and total equity value), such as, but not limited to, gold, real estate, oil, and other tangible investments having intrinsic value due to its substance and physical properties and divides each individual real asset into a certain number of shares at a given price. The shares, in aggregate, are equal to the value of the whole. The algorithm is able to work with disparate types of data, and different types of real assets, to perform the fractionalization.

The disclosed algorithm is a novel improvement over conventional methods because, in the market today for "fractionalized real assets", the standard is to pin the "whole" (e.g., real asset) to a token or coin, or a digital currency, or a new digital asset created entirely for the purpose of being the "peg" for the "whole" (and the basis of the fractionalization).

There are several key limitations to such conventional methods of real asset fractionalization.

To begin with, a token or coin can only be fractionalized to a certain point. Using a token or coin presents issues when trying to accommodate an initially large dollar value investment that needs to be split, for example, into thousands of retail-friendly priced shares (e.g. $100,000 individual investments that trading on a Financial Exchange in $75.00 increments)

Fractionalizing based on a token or coin also limits the types of metadata that can be tied to each share. For example, it may not be possible for serial numbers or other identifiers to persist with a given share or share class, if a token or coin is fractionalized.

To provide additional perspective: by definition, fungible tokens are all alike (meaning there are no differing attributes within a class of fungible tokens or coins). For example, a security token is a fungible token and metadata cannot be attached. In contrast, the disclosed algorithm creates digital shares (e.g., digital assets). Therefore, metadata can be associated and/or incorporated for each digital share.

Additionally, with conventional methods, if ongoing fractionalization is desired, more tokens or coins may need to be issued, but they are not able to be tied back to the original token or coin shares, as they would not have been minted at the same time.

There are several use cases where this conventional limitation limits the overall business model of a financial Exchange.

One instance where this functionality would be desired would be when an Owner wishes to re-price their entire Cap Table shares based on market evolution (for example, inflation).

In one example, an Owner might have on-boarded their real asset onto a financial Exchange and provided per-share price guidance of $125-$200. Potentially there is a market change, like persistent inflation, and six months from initial onboarding, the Owner would prefer to offer shares to the marketplace in the range of $300-$500. If the assets were represented by tokens or coins under conventional methods, this re-pricing would not be possible. With digital shares of the present disclosure, on the other hand, during any period of time after any initial listing it becomes possible to do a repricing of shares.

Another instance of where this functionality would be desired is with the future need for the fractionalization of an existing share (e.g. algorithmically splitting that share into a larger amount of shares)

The fractionalization algorithm of the present disclosure would be able to derive a split price (and amount of new shares) and also provide a tracking mechanism of parent-to-child shares in this future state, or "fractions of a fraction" (which is not currently possible with tokens or coins).

With conventional methods, it becomes impossible to audit the amount of outstanding tokens or coins for a given asset (to ensure the parts still equal the whole), given the absence of any overarching data attributes consistent among all the tokens or coins.

In certain aspects of the disclosed method, all of the shares belong to a certain asset, and all of these shares are on a Cap Table (and all of them are related). All of the shares will have the same price when created via the fractionalization algorithm. It is always possible to aggregate the fractionalized shares and determine an overall asset value for the whole.

The disclosed fractionalization algorithm introduces flexibility, accuracy, and efficiency into the fractionalization process. Instead of pinning share fractionalization to a token or coin, the fractionalization algorithm pins share price and share allocation against the "raw" equity dollar value of the deal. The fractionalization algorithm determines the best fractionalization model that creates the least amount of shares (within a pre-determined and desired per-share price band), with the least amount of "breakage" (meaning partial shares that remain).

The use of the disclosed fractionalization algorithm results in an efficient, logical, and auditable share creation process, with the least amount of "Loss" to the asset owners while maximizing the ability to trade and audit these real assets in a standardized secondary exchange or secondary market, as will be discussed below.

An exemplarily non-limiting initial use case for the disclosed fractionalization algorithm is with the Owner of a real asset, who would like to list their real asset on a financial Exchange for secondary trading. An example of the real asset might be an Apartment Building.

The equity investment in the Apartment Building might be coming from nine investors, with differing equity investments, for a total value of $1,445,000.00.

The Owner will use the algorithm, via a computing device, to determine how to take his current Cap Table (nine investors) and allocate a number of shares to each investor (with an associated offering price for those shares). The algorithm will determine the most efficient way to do this (meaning, the most ideal price with the least amount of "Loss"), as will be discussed more below.]

In certain aspects, the Owner can input data both from desktop or mobile device (e.g., computing device). The outputs are communicated to another software that lives on another desktop, mobile and/or cloud. In certain aspects, the fractionalization algorithm is hosted in the cloud (although it could be run on a computing device such as, but not limited to a desktop computer, a laptop computer, a mobile device, and other appropriate computing devices).

After the algorithm determines the number of shares and initial share price, the Owner will be able to proceed with Onboarding the real asset onto the Financial Exchange service. A new Cap Table will be created according to the new share distribution (per original investor). Investors will then be able to claim their shares, and list them for sale in the secondary market.

The following Stages will further illustrate the exemplarily Initial Use Case.

Stage I: Example of Original Cap Table and Equity Investment Values

The following discussion is provided for some additional background on the challenges presented in fractionalizing real assets utilizing conventional methods—and their associated equity investments—into shares. Presented are three conventional scenarios to help illustrate how quickly and easily an initial "round number" equity investment can easily result in cumbersome total equity investment values per investor.

In many less complex instances, the dollar amount of a given investment is easily divisible by round numbers (e.g. $100,000.00 is divisible by $2.00, $5.00, $10.00, $50.00, $100.00, $1,000.00, etc.). In a less complex example (Investment Example A), there might be ten investors, each with $100,000, investing in an Apartment Building—for a total investment size of $1,000,000. The $100,000 equity investment for each investor is easily fractionalized into multiple different share amounts (e.g. 250 shares at $400.00; 500 shares at $200.00).

However (and typically in more complicated deals), there can also be multiple "irregular" investment value totals for different investors. These irregular values are not easily (or even possible to be) fractionalized into round numbers. An example of this would be if one investor for $100,000.00 (in Investment Example A above) decided to withdraw from the investment at the last minute, and seven different investors (each at $100,000.00 originally) decided to evenly distribute and cover that amount. In this scenario (Investment Example B), each of the seven investors who are absorbing that withdrawal would now have an updated investment amount of $100,000.00+$14,285.71=$114,285.71. The remaining TWO investors (one has dropped out) would still be at $100,000, for a total of nine investors totaling $1,000,000.

In a third iteration (Investment Example C), potentially the nine total investors agree to equally share the cost of a cash infusion to the Apartment Building of $445,000 (the operating expenses for six months) after some last minute shortcomings are discovered in final due diligence. The total value of the investment now increases to $1,445,000. Seven investors now have equity investment of $114,285.71+(445,000/9)=$114,285.71+$49,444.44=$163,730.15. The other two have $100,000+(445,000/9)=$100,000+$49,444.44=$149,444.44. The total investment size is therefore $1,445,000.00.

At this point, there is not any obvious "whole number" of shares that can be used as the baseline to fractionalize this

investment and provide share number and share price to any of these nine investors. As such, there is a need to determine how to proceed with fractionalization in the most efficient way—with the least amount of "Loss".

Stage II: Introducing the "Loss" Concept

In the exemplarily use case, "Loss" is defined as the "remainder" of any equity investment that is not divisible by the share number and price that is determined. This remainder is called a Loss because that portion of the investment will not carry over into the new Cap Table, and therefore that portion of the investor's equity investment will not be listed or traded on the Financial Exchange.

In Investment Example C, we can see two examples of potential Loss below, based on two different desired share prices. This example is purely provided to illustrate the Loss Remainder for two sample investors following the Fractionalization process.

TABLE 1

	Cap					
Investor's Equity Value	Determined Share Price (Scenario 1)	Determined Number of Shares (Scenario 1)	Loss	Determined Share Price (Scenario 2)	Determined Number of Shares (Scenario 2)	Loss
Investor One: $163,730.15	$100.00	1,637.30	0.30	$75.00	2,183.07	0.07
Investor Two: $149,444.44	$100.00	1,494.44	0.44	$75.00	1,992.59	0.59
Sample Total			0.74			0.66

Loss would come into play based on the following two Scenarios above, where a portion of each Investor's equity investment would not be listed on the Cap Table.

Scenario One: Investor One would have a Loss of 0.30 shares (at $100.00 per share) for a total Loss of $30.00. Investor Two would have a Loss of 0.44 shares (at $100.00 per share) for a total Loss of $44.00.

Scenario Two: Investor One would have a Loss of 0.07 shares (at $75.00 per share) for a total Loss of $5.25. Investor Two would have a Loss of 0.59 shares (at $75.00 per share) for a total Loss of $44.25.

Stage III: Initial Share Price—Key Considerations (Price Band)

As discussed, a key function of the disclosed fractionalization algorithm is to set the issuance price for the factionalized shares. For example, the issuance price could be based on the general "Class type" for the real asset in question. For the exemplarily Initial Use Case, the Owner of an Apartment Building will have a rating for that asset (potentially a Class A, B, or C property). The disclosed algorithm will suggest a range (with a minimum and maximum) based on the Class.

In the exemplary Initial Use Case, if the Apartment Building is a Class C, the hypothesis for an appropriate initial share price might be within a band of $50.00 to $150.00. As the Owner begins to utilize the disclosed algorithm, an initial step will be for the algorithm to suggest a price range. After the Owner considers and then approves the range, the algorithm will then determine the best issuance price in that band (that has the least amount of Loss).

The disclosed algorithm will know what bands to suggest due to its experience (which will continue to deepen with each case through continuous learning models). The algorithm suggests a share price band based on several factors, including but not limited to: Overall market trends (e.g. higher per-share prices in inflationary economies; lower per-share prices in recessionary environments); Similar assets or offerings (e.g. Class C example above; typical listings for comparable assets based on geography); Past assets that the Owner has already listed on the exchange (e.g. a certain Owner might be known for more retail-friendly shares, or they may desire a more Institutional buyer base on the Exchange and prefer a higher per-share price); and Timing (e.g. if an Owner onboards three assets simultaneously, they may choose to have their shares priced similarly).

It is important to note that although the algorithm will suggest a per share band for the Owner based on the factors discussed above (and others), the Owner can override this suggestion.

Stage IV: Initial Share Price—Three "Settings" for the Disclosed Algorithm

After the Owner considers and approves the suggested price band (or overrides with their own), the disclosed algorithm is ready to consider the data. The algorithm returns three different per share values, based on the following three Priorities:

Zero Loss: In some instances, it will be possible for the algorithm to find a given share price that results in no Loss to any investor on the original Cap Table. This is most likely in scenarios similar to Investment Example A, where all investments are round numbers.

Best Price with Lowest Average Loss: In some cases, the Owner will prefer that the algorithm find the best price (within their preferred band) that results in the lowest average Loss. This means that for all the investors that have some Loss associated with the chosen per share price, they all share the lowest average Loss. With this outcome, none of the investors will have to bear any large Loss individually.

Best Price after Removing Outlier(s): In this instance, the algorithm will return a "round number" per share price and share count to the owner. This allows the majority of investors to have zero Loss. However, to attain this clean fractionalization outcome, the algorithm will have selected a number of investors to sustain a larger Loss (or removed them from the process entirely).

These larger Loss investors (e.g., outlier inventors) will be investors that have the most challenging equity investments for the algorithm to break down in line with the majority of the other investors. Essentially, the algorithm will determine the best common denominator, and will notice which investors make this task more difficult because of their investment values. The algorithm can then "remove them" from the dataset and re-run the fractionalization process to see the outcome without these players. Then the algorithm will re-run and determine the best price in the band.

In certain aspects, the algorithm will perform several iterations—and will highlight multiple Outliers—to get to a price in the desired band set by the Owner.

The algorithm will note to the Owner what the total Loss is by removing these Outlier investors. In this instance, the Owner is presented with a business decision: (1) they can buy out the larger "remainder" amounts from the outlier investors to make them whole or make the Loss a condition of listing on the Exchange. or (2) the Owner can use Best Price with Lowest Average Loss to have all investors bear more of the Loss equally.

No user takes any loss until they claim their shares to be listed on the Exchange. Therefore, before that, the original investment is intact, and the user is choosing to take the loss as a cost associated with trading chairs on a secondary Exchange.

FIGS. **9**A, **9**B, and **9**C collectively illustrate a flow of the fractionalization algorithm **910** suitable for use with the exemplary transaction platform of the systems in FIGS. **1** and **5-7**. In certain aspects, the disclosed fractionalization algorithm **910** functions within a standalone system that communicates with other systems via an API. In the exemplarily initial use case of a Financial Exchange, the algorithm is communicating with both the Trading System of the Exchange (commonly known as the Alternative Trading System, or "ATS"), or service, such as the transaction ATS broker/dealer **130**, and the entity, such as the transfer agent **106**, that maintains the Cap Table **912** (commonly known as the Transfer Agent or "TA"). In certain aspects, the fractionalization algorithm system integrates with additional third party systems via API.

The fractionalization algorithm can accommodate a one-to-many relationship (via API). It can both receive information and send information via API. The algorithm gathers data and ingests it via API, performs the fractionalization process described (above and below), and then sends or transmits the finalized product (the output, or "answers") back to either related or unrelated parties via API.

The source(s) of information and destination(s) of output can be either related parties or unrelated parties. An example of a related party would be the ATS (e.g., the transaction ATS broker/dealer **130**) and TA (e.g., the transfer agent **106**) discussed in the context of the financial exchange. An example of an unrelated party would be a third party desiring pricing guidance on assets (for example, an auction house or a car dealership).

The API(s) that calls data into the system is able to ingest data in varied forms (according to what the user inputs).

The product that is returned via API is mapped into the system(s) and structure(s) that are required by the ingesting party. Part of the responsibility of the fractionalization algorithm **910** is to map the data received into a usable format, and then provide a product that is fully integrated into the required/desired format of the recipient.

Process Details

The original Cap Table **912** (that is created by the Transfer Agent **106**) for the asset serves as the basis for the fractionalization. The disclosed fractionalization algorithm **910** can retrieve the original Cap Table **912** from the Transfer Agent **106** via the Trading System of the Exchange, such as the transaction ATS broker/dealer **130**, which was uploaded or communicated to the Transfer Agent **106** via the Trading System of the Exchange by the Asset Owner. The Cap Table **912** provides the information for which people/entities have invested in the asset, and how much money they have invested. At times, there is a "share number" that is associated with that investment; at other times, it is simply an Ownership Percentage that is calculated ($X invested is Y % of the overall ownership structure).

The algorithm ingests the Cap Table **912** data. It is able to accept this data in multiple forms: Excel, photos of documents, and text documents are just some examples.

As depicted at block **914**, the Owner first sets the boundary for their per-share price. This will be dependent on the market, their preference for fewer or more shares in the secondary market, or other factors. The minimum and maximum share prices serve as the guardrail for the algorithm **910**; for example, $20.00 could be set as the desired minimum, and $100.00 could be set as the desired maximum.

As depicted at blocks **916**, the system, such as the transaction platform of the systems in FIGS. **1** and **5-7**, receives a request from the initial share pricing and retrieves the cap table **912** to extract all relevant fields (e.g., names, social security numbers, equity, and other appropriate fields) . With the fields extracted, investors identified in the cap table **912** are separated into individual documents for input to the fractionalization algorithm **910**, as depicted at step **918**.

As depicted at block **920**, the fractionalization algorithm **910** evaluates all of the possible denominators with the specified Price Range based on the asset and identifies all potential common denominators. The fractionalization algorithm **910** will then determine the Best Zero Loss Price, as depicted at block **922**, which may require multiple iterations to determine. As such, the fractionalization algorithm **910** determines whether the Best Zero Loss Price has been determined, as shown at decision block **924**.

if the Best Zero Loss Price has not been determined, the fractionalization algorithm **910** evaluates based on preferences received from the Owner providing guidance on a preference (or preferences), within the three Priorities, for what the algorithm will search for: Zero Loss; Best Price with Lowest Average Loss; Best Price after Removing Outlier(s), as depicted at block **926**. If the fractionalization algorithm **910** determines that there are outliers that need to be removed, at decision block **928**, the fractionalization algorithm **910** returns to block **926** until the outliers are removed and then proceeds to block **930** to determine the Best Possible Share Prices. If the fractionalization algorithm **910** determines that the Best Zero Loss Price is found, at block **924**, it then proceeds to block **930** to determine the Best Possible Share Prices.

The disclosed algorithm will run all scenarios according to the desired/selected parameters from the Owner and return all results. For each Priority, the returned result will be a per-share price within the Owners preferred guideline band, and a number of outstanding shares for each investor.

After the Owner reviews the results of the Best Possible Share Prices (potentially from multiple Priorities) and determines how they would like to proceed, the algorithm **910** will create a new Cap Table, as depicted at block **932**, that reflects the new share allocation (at the determined price) for each investor.

The Owner will also be given an output that reflects any associated Loss for investor(s). They are able to discuss this outcome with any investors, if desired. In the Initial Use Case of the Financial Exchange, the Owner will typically include a clause (acknowledging that a certain amount of Loss is acceptable) in the legal agreement that Investors review and sign as part of their share claim process.

In certain aspects, the system is able to Auto-suggest the price range based on asset types. In certain aspects, based on the security type, the system (through proprietary AI ML calculations) may come up with a suggested pricing range based on similar asset types and classes. In certain aspects, the system will then suggest a price and the asset owner may also choose their own price. The system will present multiple options. In certain aspects, the algorithm finds the best price with no further user input (the system just determines what the best price is). In certain aspects, the user makes that last determination. In certain aspects, the system may suggest the final price. The system also may give the user

multiple options that all met their goals (100 is divisible by 10, 20, and 5)—and those options will all be provided to the user.

Each of the processes, methods, and algorithms described in the preceding sections may be embodied in, and fully or partially automated by, code components executed by one or more computer systems or computer processors comprising computer hardware. The one or more computer systems or computer processors may also operate to support performance of the relevant operations in a "cloud computing" environment or as a "software as a service" (SaaS). The processes and algorithms may be implemented partially or wholly in application-specific circuitry. The various features and processes described above may be used independently of one another, or may be combined in various ways. Different combinations and sub-combinations are intended to fall within the scope of this disclosure, and certain method or process blocks may be omitted in some implementations. The methods and processes described herein are also not limited to any particular sequence, and the blocks or states relating thereto can be performed in other sequences that are appropriate, or may be performed in parallel, or in some other manner. Blocks or states may be added to or removed from the disclosed example embodiments. The performance of certain of the operations or processes may be distributed among computer systems or computers processors, not only residing within a single machine, but deployed across a number of machines.

As used herein, a circuit might be implemented utilizing any form of hardware, or a combination of hardware and software. For example, one or more processors, controllers, ASICs, PLAs, PALs, CPLDs, FPGAs, logical components, software routines or other mechanisms might be implemented to make up a circuit. In implementation, the various circuits described herein might be implemented as discrete circuits or the functions and features described can be shared in part or in total among one or more circuits. Even though various features or elements of functionality may be individually described or claimed as separate circuits, these features and functionality can be shared among one or more common circuits, and such description shall not require or imply that separate circuits are required to implement such features or functionality. Where a circuit is implemented in whole or in part using software, such software can be implemented to operate with a computing or processing system capable of carrying out the functionality described with respect thereto, such as the computer system **800**.

As used herein, the term "or" may be construed in either an inclusive or exclusive sense. Moreover, the description of resources, operations, or structures in the singular shall not be read to exclude the plural. Conditional language, such as, among others, "can," "could," "might," or "may," unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements and/or steps.

Terms and phrases used in this document, and variations thereof, unless otherwise expressly stated, should be construed as open ended as opposed to limiting. Adjectives such as "conventional," "traditional," "normal," "standard," "known," and terms of similar meaning should not be construed as limiting the item described to a given time period or to an item available as of a given time, but instead should be read to encompass conventional, traditional, normal, or standard technologies that may be available or known now or at any time in the future. The presence of broadening words and phrases such as "one or more," "at least," "but not limited to" or other like phrases in some instances shall not be read to mean that the narrower case is intended or required in instances where such broadening phrases may be absent.

The foregoing description of the present disclosure has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure to the precise forms disclosed. The breadth and scope of the present disclosure should not be limited by any of the above-described exemplary embodiments. Many modifications and variations will be apparent to the practitioner skilled in the art. The modifications and variations include any relevant combination of the disclosed features. The embodiments were chosen and described in order to best explain the principles of the disclosure and its practical application, thereby enabling others skilled in the art to understand the disclosure for various embodiments and with various modifications that are suited to the particular use contemplated. It is intended that the scope of the disclosure be defined by the following claims and their equivalence.

In one aspect, a method may include an operation, an instruction, and/or a function and vice versa. In one aspect, a clause or a claim may be amended to include some or all of the words (e.g., instructions, operations, functions, or components) recited in other one or more clauses, one or more words, one or more sentences, one or more phrases, one or more paragraphs, and/or one or more claims.

To illustrate the interchangeability of hardware and software, items such as the various illustrative blocks, modules, components, methods, operations, instructions, and algorithms have been described generally in terms of their functionality. Whether such functionality is implemented as hardware, software or a combination of hardware and software depends upon the particular application and design constraints imposed on the overall system. Skilled artisans may implement the described functionality in varying ways for each particular application.

The functions, acts or tasks illustrated in the Figures or described may be executed in a digital and/or analog domain and in response to one or more sets of logic or instructions stored in or on non-transitory computer readable medium or media or memory. The functions, acts or tasks are independent of the particular type of instructions set, storage media, processor or processing strategy and may be performed by software, hardware, integrated circuits, firmware, microcode and the like, operating alone or in combination. The memory may comprise a single device or multiple devices that may be disposed on one or more dedicated memory devices or disposed on a processor or other similar device. When functions, steps, etc. are said to be "responsive to" or occur "in response to" another function or step, etc., the functions or steps necessarily occur as a result of another function or step, etc. It is not sufficient that a function or act merely follow or occur subsequent to another. The term "substantially" or "about" encompasses a range that is largely (anywhere a range within or a discrete number within a range of ninety-five percent and one-hundred and five percent), but not necessarily wholly, that which is specified. It encompasses all but an insignificant amount.

As used herein, the phrase "at least one of" preceding a series of items, with the terms "and" or "or" to separate any of the items, modifies the list as a whole, rather than each member of the list (e.g., each item). The phrase "at least one of" does not require selection of at least one item; rather, the phrase allows a meaning that includes at least one of any one of the items, and/or at least one of any combination of the items, and/or at least one of each of the items. By way of

example, the phrases "at least one of A, B, and C" or "at least one of A, B, or C" each refer to only A, only B, or only C; any combination of A, B, and C; and/or at least one of each of A, B, and C.

The word "exemplary" is used herein to mean "serving as an example, instance, or illustration." Any embodiment described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments. Phrases such as an aspect, the aspect, another aspect, some aspects, one or more aspects, an implementation, the implementation, another implementation, some implementations, one or more implementations, an embodiment, the embodiment, another embodiment, some embodiments, one or more embodiments, a configuration, the configuration, another configuration, some configurations, one or more configurations, the subject technology, the disclosure, the present disclosure, other variations thereof and alike are for convenience and do not imply that a disclosure relating to such phrase(s) is essential to the subject technology or that such disclosure applies to all configurations of the subject technology. A disclosure relating to such phrase(s) may apply to all configurations, or one or more configurations. A disclosure relating to such phrase(s) may provide one or more examples. A phrase such as an aspect or some aspects may refer to one or more aspects and vice versa, and this applies similarly to other foregoing phrases.

A reference to an element in the singular is not intended to mean "one and only one" unless specifically stated, but rather "one or more." The term "some" refers to one or more. Underlined and/or italicized headings and subheadings are used for convenience only, do not limit the subject technology, and are not referred to in connection with the interpretation of the description of the subject technology. Relational terms such as first and second and the like may be used to distinguish one entity or action from another without necessarily requiring or implying any actual such relationship or order between such entities or actions. All structural and functional equivalents to the elements of the various configurations described throughout this disclosure that are known or later come to be known to those of ordinary skill in the art are expressly incorporated herein by reference and intended to be encompassed by the subject technology. Moreover, nothing disclosed herein is intended to be dedicated to the public regardless of whether such disclosure is explicitly recited in the above description. No claim element is to be construed under the provisions of 35 U.S.C. § 112(f) unless the element is expressly recited using the phrase "means for" or, in the case of a method claim, the element is recited using the phrase "step for."

While this specification contains many specifics, these should not be construed as limitations on the scope of what may be claimed, but rather as descriptions of particular implementations of the subject matter. Certain features that are described in this specification in the context of separate embodiments can also be implemented in combination in a single embodiment. Conversely, various features that are described in the context of a single embodiment can also be implemented in multiple embodiments separately or in any suitable subcombination. Moreover, although features may be described above as acting in certain combinations and even initially claimed as such, one or more features from a claimed combination can in some cases be excised from the combination, and the claimed combination may be directed to a subcombination or variation of a subcombination.

The subject matter of this specification has been described in terms of particular aspects, but other aspects can be implemented and are within the scope of the following claims. For example, while operations are depicted in the drawings in a particular order, this should not be understood as requiring that such operations be performed in the particular order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. The actions recited in the claims can be performed in a different order and still achieve desirable results. As one example, the processes depicted in the accompanying figures do not necessarily require the particular order shown, or sequential order, to achieve desirable results. In certain circumstances, multitasking and parallel processing may be advantageous. Moreover, the separation of various system components in the aspects described above should not be understood as requiring such separation in all aspects, and it should be understood that the described program components and systems can generally be integrated together in a single software product or packaged into multiple software products.

The title, background, brief description of the drawings, abstract, and drawings are hereby incorporated into the disclosure and are provided as illustrative examples of the disclosure, not as restrictive descriptions. It is submitted with the understanding that they will not be used to limit the scope or meaning of the claims. In addition, in the detailed description, it can be seen that the description provides illustrative examples and the various features are grouped together in various implementations for the purpose of streamlining the disclosure. The method of disclosure is not to be interpreted as reflecting an intention that the claimed subject matter requires more features than are expressly recited in each claim. Rather, as the claims reflect, inventive subject matter lies in less than all features of a single disclosed configuration or operation. The claims are hereby incorporated into the detailed description, with each claim standing on its own as a separately claimed subject matter.

The claims are not intended to be limited to the aspects described herein, but are to be accorded the full scope consistent with the language claims and to encompass all legal equivalents. Notwithstanding, none of the claims are intended to embrace subject matter that fails to satisfy the requirements of the applicable patent law, nor should they be interpreted in such a way.

What is claimed is:

1. A computer-implemented method digitally re-formulating fractional interests in a real asset comprising a computer system:

electronically ingesting capitalization table data from a digitally stored capitalization table, the capitalization table data defining capitalization of the real asset and at least including fields indicating: (1) a plurality of investors in the real asset and (2) a fiat currency investment each of the plurality of investors has invested in the real asset;

triggering an asset price calculation from an alternative trading system (ATS) exchange;

subsequent to triggering the asset price calculation:

extracting fields relevant to digitally re-formulating the real asset, including the plurality of investors and corresponding fiat currency investments, from the capitalization table data; and

accessing a continuous learning model trained on capitalization table data and a corresponding identified price share denominator from at least one prior digital re-formulation of fractional interests;

utilizing the continuous learning model automatically suggesting a guardrail share pricing range based on a plurality of pricing factors, the guardrail share pricing

band defining a minimum asset share price and a maximum asset share price;

identifying a denominator within the guardrail share pricing range minimizing investor loss and representing a share price for shares in the real asset, including automatically iterating over a plurality of possible denominators in view of the guardrail share pricing range and the extracted fields;

automatically deepening the guardrail share pricing suggestion capabilities of the continuous learning model based on the ingested capitalization table data and identified denominator;

fractionalizing the capitalization of the real asset into a plurality of tokens, each token representing a digital share of the real asset and having a fiat currency value of the share price;

per each investor included in the plurality of investors:

assigning a number of tokens to the investor corresponding to the investor's fiat currency investment in the real asset ingested in the capitalization table data; and

storing the assigned number of tokens in a corresponding ATS exchange managed digital wallet;

creating a new capitalization table indicating each investors assigned number of shares and the share price;

performing a buy/sell transaction for a portion of the real asset at the ATS exchange based on share price, the buy/sell transaction electronically transferring at least one token, from among the plurality of tokens, to an ATS exchange managed digital wallet of a new investor in the real asset and updating the new capitalization table to indicate the new investor has invested in the real asset;

accessing a token, from among the plurality of tokens, representing a digital share of the real asset;

splitting the share price of digital share into a split share price;

creating a plurality of new digital shares of the real asset, each new digital share representing part of the digital share;

fractionalizing the token into a plurality of other tokens, each other token representing a new digital share of the real asset and having a fiat currency value of the split share price; and

automatically and electronically tracking a parent-to-child relationship between the digital share as a parent share and each of the plurality of new digital shares as a corresponding child share.

2. The method of claim **1**, wherein utilizing the continuous learning model automatically suggesting a guardrail share pricing range based on a plurality of pricing factors comprising utilizing the continuous learning model automatically suggesting a guardrail pricing range based on other assets of similar asset types and classes.

3. The method of claim **1**, wherein identifying a denominator within the guardrail share pricing range comprises receiving a user submitted denominator.

4. The method of claim **1**, wherein identifying a denominator within the guardrail share pricing range minimizing investor loss comprises identifying a denominator that divides the capitalization of the asset with one of: zero loss, best price with lowest average loss, or best price after removing outliers.

5. The method of claim **1**, wherein utilizing the continuous learning model automatically suggesting a guardrail share pricing range based on a plurality of pricing factors comprises utilizing the continuous learning model automatically suggesting a guardrail share pricing range based on two or more of: market trends, offers of other real assets similar to the real asset, past real assets listed by an owner of the real asset on the ATS exchange, or timing.

6. A system comprising:

one or more memories comprising instructions; and

one or more processors configured to execute the instructions, which, when executed, cause the one or more processors to:

electronically ingest capitalization table data from a digitally stored capitalization table, the capitalization table data defining capitalization of the real asset and at least including fields indicating: (1) a plurality of investors in the real asset and (2) a fiat currency investment each of the plurality of investors has invested in the real asset;

trigger an asset price calculation from an alternative trading system (ATS) exchange;

subsequent to triggering the asset price calculation:

extract fields relevant to digitally re-formulating the real asset, including the plurality of investors and corresponding fiat currency investments, from the capitalization table data; and

access a continuous learning model trained on capitalization table data and a corresponding identified price share denominator from at least one prior digital re-formulation of fractional interests;

utilizing the continuous learning model automatically suggesting a guardrail share pricing range based on a plurality of pricing factors, the guardrail share pricing band defining a minimum asset share price and a maximum asset share price;

identify a denominator within the guardrail share pricing range minimizing investor loss and representing a share price for shares in the real asset, including automatically iterating over a plurality of possible denominators in view of the guardrail share pricing range and the extracted fields;

automatically deepen the guardrail share pricing suggestion capabilities of the continuous learning model based on the ingested capitalization table data and identified denominator;

fractionalize the capitalization of the real asset into a plurality of tokens, each token representing a digital share of the real asset and having a fiat currency value of the share price;

per each investor included in the plurality of investors:

assign a number of tokens to the investor corresponding to the investor's fiat currency investment in the real asset ingested in the capitalization table data; and

store the assigned number of tokens in a corresponding ATS exchange managed digital wallet;

create a new capitalization table indicating each investors assigned number of shares and the share price;

perform a buy/sell transaction for a portion of the real asset at the ATS exchange based on share price, the buy/sell transaction electronically transferring at least one token, from among the plurality of tokens, to an ATS exchange managed digital wallet of a new investor in the real asset and updating the new capitalization table to indicate the new investor has invested in the real asset;

access a token, from among the plurality of tokens, representing a digital share of the real asset;

split the share price of digital share into a split share price;

create a plurality of new digital shares of the real asset, each new digital share representing part of the digital share;

fractionalize the token into a plurality of other tokens, each other token representing a new digital share of the real asset and having a fiat currency value of the split share price; and

automatically and electronically track a parent-to-child relationship between the digital share as a parent share and each of the plurality of new digital shares as a corresponding child share.

7. The system of claim **6**, wherein the instructions, which, when executed, cause the one or more processors to utilize the continuous learning model automatically suggesting a guardrail share pricing range based on a plurality of pricing factors comprise instructions, which, when executed, cause the one or more processors to utilize the continuous learning model automatically suggesting a guardrail share pricing range based on other assets of similar asset types and classes.

8. The system of claim **6**, wherein the instructions, which, when executed, cause the one or more processors to identify a denominator within the guardrail share pricing range comprise instructions, which, when executed, cause the one or more processors to receive a user submitted denominator.

9. The system of claim **6**, wherein the instructions, which, when executed, cause the one or more processors to identify a denominator within the guardrail share pricing range minimizing investor loss comprise instructions, which, when executed, cause the one or more processors to identify a denominator that divides the capitalization of the asset with one of: of: zero loss, best price with lowest average loss, or best price after removing outliers.

10. The system of claim **6**, wherein the instructions, which, when executed, cause the one or more processors to utilize the continuous learning model automatically suggesting a guardrail share pricing range based on a plurality of pricing factors comprise instructions, which, when executed, cause the one or more processors to utilizing the continuous learning model automatically suggesting a guardrail share pricing range based on two or more of: market trends, offers of other real assets similar to the real asset, past real assets listed by an owner of the real asset on the ATS exchange, or timing.

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